Joint Pub 3-34

Engineer Doctrine for Joint Operations

November 1997
First Draft

PREFACE

1. Scope.

This publication incorporates joint and Service doctrine into a single-source publication that provides the guidance and procedures necessary to plan, coordinate, and conduct timely and tailored joint engineer operations across the range of military operations.

2. Purpose.

This publication has been prepared under the direction of the Chairman of the Joint Chiefs of Staff. It sets forth doctrine to govern the joint activities and performance of the Armed Forces of the United States in joint operations, as well as the doctrinal basis for US military involvement in multinational and interagency operations. It provides military guidance for the exercise of authority by combatant commanders and other joint force commanders and prescribes doctrine for joint operations and training. It provides military guidance for use by the Armed Forces in preparing their appropriate plans. It is not the intent of this publication to restrict the authority of the joint force commander (JFC) from organizing the force and executing the mission in a manner the JFC deems most appropriate to ensure unity of effort in the accomplishment of the overall mission.

3. Application.

a. Doctrine and guidance established in this publication apply to the commanders of combatant commands, subunified commands, joint task forces, and subordinate components of these commands. These principles and guidance may also apply when significant forces of one Service are attached to forces of another Service or when significant forces of one Service support forces of another Service.

b. The guidance in this publication is authoritative. As such, this doctrine will be followed except when, in the judgment of the commander, exceptional circumstances dictate otherwise. If conflicts arise between the contents of this publication and the contents of Service publications, this publication will take precedence for the activities of joint forces unless the Chairman of the Joint Chiefs of Staff, normally in coordination with the other members if the Joint Chiefs of Staff, has provided more current and specific guidance. Commanders of forces operating as part of a multinational (alliance or coalition) military command should follow multinational doctrine and procedures ratified by the United States. For doctrine and procedures not ratified by the United States, commanders should evaluate and follow the multinational command's procedures, where applicable.

For the Chairman of the Joint Chiefs of Staff

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Vice Admiral, US Navy
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DRAFT JOINT PUB 3-34
ENGINEER DOCTRINE FOR JOINT OPERATIONS

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Joint Engineer Fundamentals

> Engineers, both Army and Seabees, were under Commander Construction Troops who, in turn, was under the Island Commander, Major General Fred C. Wallace, USMC. Airfield construction and supply roads had priority; other base developments could wait until the island was secured. The face of the island was changed more than it had been for thousands of years by multi-lane roads, traffic circles, water points, quonset villages, tank farms, storage dumps, and hospitals.
>
> *Okinawa Secured,* "Victory in the Pacific"
> Samuel Eliot Morrison
> History of US Naval Operations in World War II

1. **The Role of Engineers.** Engineers have a critical role in unified actions and joint warfare. Unified action goes beyond the concept of joint operations and has the broader connotation of the synchronized application of all instruments of national and multinational power. Unified action includes the engineer activities of nonmilitary organizations as well as military forces. The success of future operations depends on how effectively commanders employ engineer resources across the entire range of military operations. Future commanders must be able to visualize and create the best fit of available forces to produce immediate effects and achieve the desired results. To achieve seamless integration across this range, the armed forces must be fully joint institutionally, organizationally, intellectually, and technically. Toward this end, the total engineer force of active and reserve, civilian and contractor, host nation and allies constitute the primary resources that commanders can use to accomplish the mission. If the experiences of the Gulf War, Somalia, Haiti, Hurricane Andrew, and Bosnia are applied to future military operations, engineer operations will include many Department of Defense civilians as well as the services of nongovernmental organizations (NGOs), private volunteer organizations

(PVOs), international organizations (IOs), and other US Government agencies. Figure I-1 illustrates the role of engineers in joint task forces.

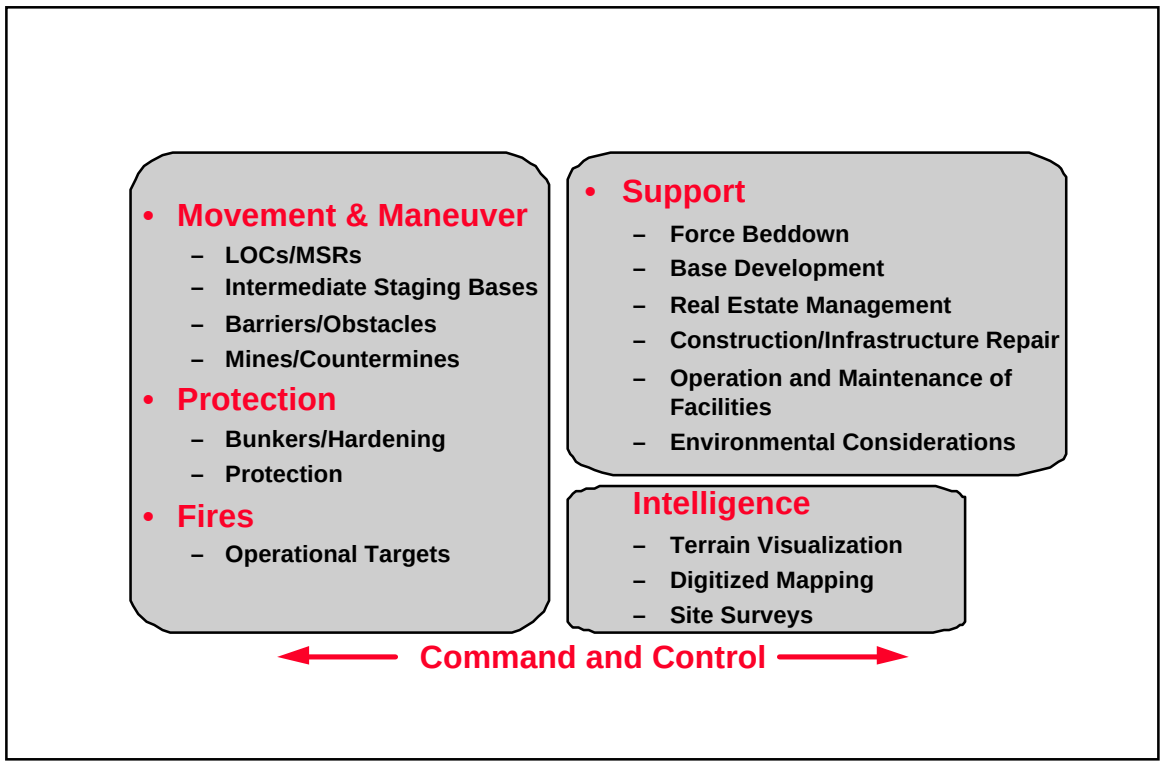

Figure I-1. Engineers in the Joint Force

a. **Engineering as a Force Multiplier.** When its full range of capabilities are employed, engineering can be a significant force multiplier for the joint force commander. It aids overall success by shaping the best advantage, a variety of conditions under which military operations or military operations other than war must be conducted. The joint force commander plans and conducts engineer operations in support of his overall concepts of operations, intelligence, and logistics. The joint force commander will have a mix of engineering capabilities. The relative mix includes mission, enemy, time, troops available, terrain, civilian considerations (METT-TC). Each Service has engineer capabilities and units that are organized, trained, and equipped for Service missions. These capabilities are applied against the land, air, and

maritime components of the commander-in-chief's (CINC's) campaign plan. JP 3-0, "Doctrine for Joint Operations," describes the fundamentals of joint warfare. Within the context of the joint operational environment, engineer operations develop the battlespace for tactical maneuver and enhance strategic and operational movement**.** Engineer operations provide support to logistics and sustainment operations, build topographic data bases, provide terrain visualization, construct protective fortifications, enhance quality of life, and prepare the transition to war-termination operations.

(1) **Combat Engineering.** Combat engineering is an integral part of the joint force commander's ability to apply dominant maneuver. Army and Marine Corps combat engineers normally conduct operations as an integrated part of maneuver forces. Combat engineers shape the battlespace by enhancing the mobility of joint forces and by denying mobility and key terrain to the enemy. Combat engineers gain, maintain, and exploit advantages that focus and enhance the shock and effectiveness of combined arms operations. Engineer units—

- Conduct breaching, bridging, and diving operations to overcome man-made and natural obstacles.
- Assault across beaches and against fortified positions.
- Emplace obstacles to deny mobility to enemy forces and enhance the effects of friendly fires.
- Provide combat trails and forward aviation operating areas to enhance the tactical mobility of the combat force.

(2) **Topographic Engineering.** Topographic engineering is the provision of certain elements of geospatial information and services to operational commanders and staffs at all echelons throughout the range of operations. Topographic units provide operational and tactical terrain analyses, terrain visualization, digitized terrain products, nonstandard map products, and baseline survey data to combat, combat support, and combat service support forces in all phases of operations throughout the theater.

(3) **General Engineering.** General engineering consists of activities that increase the mobility, survivability, and sustainability of tactical and logistical units generally to the rear of the forward edge of battle area. It entails the operations, maintenance, and performance of war damage, repair, and other engineering functions that support joint military operations. Engineer units identify, assess, upgrade, repair, and construct facilities required for force projection and joint reception, staging, onward movement, and integration (JRSO&I). During deployment and conduct of operations, engineer units provide specialized capabilities such as —

- Logistics facilities.
- Firefighting services.
- Well-drilling.
- Underwater construction.
- Construction and repair of airfields and ports.
- Maintenance of lines of communication,.

. For detailed discussion of general engineering, see JP 4-04, "Joint Doctrine for Civil Engineering Support."

b. **Special Considerations.** Experiences in the Gulf War, Somalia, Haiti, and Bosnia, indicate that some issues become critical concerns of commanders because of external political factors. Some of these considerations can be mitigated through engineer operations.

(1) **Force Protection.** An astute enemy will attempt to monopolize on American sensitivity to casualties. This sensitivity is especially acute when vital interests of the United States are not directly affected by the operation. All engineer units play important roles in force-protection operations. They analyze the terrain to best utilize its protection and construct protective structures such as berms, revetments, obstacles, fortifications, specially designed and reinforced buildings, and sophisticated facility alarm systems. Engineers help protect the force from a variety of threats—including crimes of opportunity against US personnel and property, terrorists acts, and weapons of mass destruction.

(2) **Facilities Acquisition.** Facilities acquisition covers the spectrum of real estate leasing to new construction. At the joint level, the combatant commander is responsible for developing theater construction policies, providing prioritization guidance that conforms with the concept of operations, and setting facilities standards. Component commanders are responsible for planning, prioritizing, and coordinating their facilities requirements to conform with the combatant commander's guidance.

Facilities are fundamental to JRSO&I, sustainment of logistics, and some combat operations. If the host nation infrastructure does not support initial or sustained operations, engineers will be required to improve and maintain facilities. If local governments are capable of maintaining or improving infrastructures, agreements may be made for their support. See JP 4-04, "Joint Doctrine for Civil Engineering Support," for detailed discussion of facilities acquisition.

(3) **Posthostilities Operations (PHO).** Engineering is a vital component of PHO. Engineers have major roles in support to redeployment of the force and environmental restoration. They may be tasked to support nation assistance. In redeployment of the force, engineers prepare facilities for reverse JRSO&I, construct wash racks, construct redeployment facilities, and prepare collection points for hazardous materials. In environmental restoration, engineers support cleanup of the battlefield and removal of hazardous and toxic materials. Engineer support to foreign governments is determined by US political interests and objectives in the stabilization of the region.

c. Joint Force Engineer Imperatives. In joint operational experiences, certain patterns have emerged from lessons learned. Although not all inclusive, these imperatives are important for the joint force commander to understand how best to employ engineers. These imperatives include—

- Centralized planning, decentralized execution.
- Priorities allocation.

- Early planning participation.
- Logistics support.
- Staff relationships.

(1) **Centralized Planning, Decentralized Execution.** Execution of engineer tasks requires careful control and coordination of units, personnel, contractors, equipment, and materials. Engineer resources are always scarce. The most effective use of scarce resources is achieved through centralized planning at the highest operational level, with execution delegated to the lowest practical level. Centralized coordination also precludes competition for scarce engineer resources.

(2) **Priorities Allocation.** To assure the best use of engineer resources, senior commanders must assign priorities to the engineer effort. The completion of high-priority tasks may require augmentation from nonengineer units.

(3) **Early Planning Participation.** The successful engineer preparation of the theater depends upon the availability of units, equipment and materiel, including access to reserve forces. It is critical to mission execution that engineers be involved in the planning process. Engineer work is a function of planning and time. Engineers must participate in the operational planning process from the onset of crisis planning since a surge of engineer effort may be required at the beginning of operations.

(4) **Logistics Support..** Successful execution of engineer missions depends upon timely availability of a variety of equipment, stores, and materiel.

Most engineer supplies and equipment are high-weight/high-cube and are a challenge to move and store. Logistics must support the engineer effort.

(5) **Staff Relationships.** Joint force engineers work across all staff elements to coordinate policy, planning, and operations issues to support the entire battlespace, all phases of operations, and funding requirements unique to construction. Principal staff agencies frequently requiring direct engineer consultation are contracting, resourcing, operations, logistics, intelligence, and personnel. See Chapter II for a detailed discussion of staff options.

d. **Coordination with Nonmilitary Activities.** There may be other agencies working concurrently within the area of operations (AO). Nonmilitary organizations with engineer capabilities may include—

- The Agency for International Development (USAID).
- Nongovernmental organizations (NGOs) such as relief agencies and corporations.
- International organizations (IOs) such as the International Red Cross.

For details of working with nonmilitary agencies, see JP 3-08 "Interagency Coordination During Joint Operations."

2. Engineer Force Tailoring. Service engineer units have specific missions for which they are organized, trained, and equipped. Missions are rarely a perfect match of capabilities and requirements. The joint force commander and the joint force engineer can exercise prioritization to best influence the joint effort.

a**. Capabilities**. Each Service has engineering units and capabilities to meet specific Service needs. However, each Service can provide common-use engineering at the theater level. Each Service has unique engineering capabilities arising from itsdifferent Title 10 responsibilities. The Army and Marine Corps have both combat and construction engineer units. Air Force and Navy engineers perform base construction and repair work. The host nation has certain engineering capabilities. Hired contractors frequently provide construction support. This mixture of capabilities and arrival setup times can be managed across service lines. Available resources may change during phases of the operations.

> Fundamental to the nature of joint operations is the need to tailor force packages and command structures to suit the situation at hand.

b**. Preparation of the Theater.** Engineering is critical for preparing the theater. When military forces of the United States are called upon to support national interests, they must have the capability to project elements of power from the continental United States or from overseas bases into the AO. Force projection and buildup requires infrastructure such as airfields, ports, roads and bridges, water sources, electrical power, and more. Force buildup requires either adequate preexisting infrastructure or rehabilitation and construction of new facilities.

c**. Decisive Operations at Lower Costs.** Engineering preparation of the battlespace sets the stage for subsequent decisive operations. Adequate engineer preparation will—

- Preserve US and allied resources
- Increase the rate of force buildup.

- Minimize force footprint.
- Ensure needed resources are available for campaign execution.
- Enhance force protection.
- Expedite decisive operations.
- Support war termination/transition operations.

3. **Conclusion.** Engineer units of all the Services are inherently useful and versatile organizations. Joint force commanders have engineering requirements that exceed available engineer work capacity. When engineering requirements and capabilities are coordinated centrally through a joint force engineer, scarce resources are effectively matched to the joint force commander's intent.

Chapter II

Command Relationships

> A properly functioning staff extends the eyes, ears, and will of a commander by learning the commander's policies and working within them; keeping the commander informed of pertinent information; developing basic decisions into orders; ensuring compliance with these orders; and supplementing the commander's efforts to secure unity of action throughout the command.
>
> The Joint Staff Officer's Guide, 1991

1. **Responsibilities.** Each joint operation has unique engineer requirements. The joint force commander must determine command relationships and staff responsibilities to accomplish assigned objectives.

> To fully exploit military engineering at the operational level, joint or combined force commanders should recognize it as an essential aspect of his scheme of maneuver in an overall campaign plan involving naval, air, and land forces.

a. **Engineer Staff.** The JFC establishes a joint force engineer staff for engineer matters. The engineer staff develops engineer policy, guidance, and standards for the joint force. The engineer staff coordinates mobility, countermobility, survivability, general engineering, and topographic engineering requirements needed to ensure joint force mission success. Because of the engineer requirements through all phases of operations across the battlespace, the joint engineer should have a first-hand and unfiltered understanding of the commander's intentions. The engineer staff is responsible for facilities, real estate, and environmental considerations as detailed in JP 4-04, "Joint Doctrine for Civil Engineering Support" and the special functions

discussed below. The engineer staff provides support for intelligence, operations, and planning.

(1) **Special Functions.** The joint force engineer has staff responsibility for the following areas dependent on the Service origin of the core joint force. These functions include—

- Topographic support.
- Eexplosive ordnance disposal (EOD).
- Fire protection.
- Support to nuclear, biological, and chemical (NBC) decontamination and recovery operations.

These functions reside within the engineer capability of at least one Service. The joint force engineer may be tasked with providing staff oversight.

(2) **Intelligence.** Throughout the intelligence cycle, the engineer staff assists the J2, in coordinating intelligence requirements and providing geospatial products to support operations. The engineer staff provides technical assistance in identifying, prioritizing, and validating engineer intelligence needs and assists in coordinating collection of engineer information. See JP 2-0, "Joint Doctrine for Intelligence Support to Operations" for information on the intelligence cycle and JP 2-01.1, "Joint Tactics, Techniques, and Procedures for Intelligence Support to Targeting."

(3) **Operations.** The engineer staff monitors the deployment, employment, and missions status of major subordinate Service component engineer forces. The primary focus of engineer operations is to achieve the commander's intent through mobility, countermobility, survivability, general engineering, and topographic engineering operations. The engineer staff works directly with the operations staff.

It provides engineer representation on the Joint Targeting Coordination Board (JTCB) to analyze engineer risk for future operations. See JP 3-0, "Doctrine for Joint Operations", and "JP 2-03, "Joint Tactics, Techniques, and Procedures for Global Geospatial Information and Services Support to Joint Operations" for details in this area.

(4) **Plans.** The engineer staff participates in the planning process through representation on the joint planning staff (e.g., J5, joint planning group). The engineer planner addresses all potential engineer requirements during the planning process.

b. **Staff Options.** The JFC develops his staff based on mission requirements. The range of military operations in the modern battlespace requires that the JFC have a full understanding and visibility of the multitude of capabilities at his disposal. Each of the following placement options for the engineer staff has merit, depending on the mission and operational circumstances. Regardless of the option, or hybrid of options, the requirement for the staff engineer remains, as does the need for constant communication and coordination throughout the staff.

(1) **J3 Staff.** When the focus of engineer effort predominately supports operational movement and maneuver, fires, and protection, the JFC should consider placing his engineer staff as a cell within the J3 to coordinate mobility, countermobility, and survivability requirements. During these operations, this option will provide the fastest exchange of information during crisis action planning and optimize use of supporting capabilities.

(2) **J4 Staff.** When the engineer effort predominately supports operations at the theater level, engineer issues tend to revolve around missions that support logistics operations. During these operations the JFC may be best served by placing the engineer staff as an element under the J4 to facilitate the planning and coordination of these requirements.

(3). **Special Staff.** When the engineer effort is the primary focus of the operation, the JFC is usually best served by establishing an engineer special staff element that reports directly to the JFC. This special staff option provides the greatest flexibility in orchestrating diverse engineer operations and allows for the greatest visibility of engineer capabilities, requirements, and responsibilities throughout the staff.

2. **Organization.** The JFC should strive to maintain flexibility in the organization of engineer forces. The following organizations are examples of command and control options the JFC can use to maximize the effectiveness of engineers to accomplish mission objectives.

a. **Component Command.** Under traditional joint force organization, component commanders maintain command over their Service engineer forces. This structure is best used when engineers engage in direct support of Service component missions. This type of command and control relationship was used during the Gulf War.

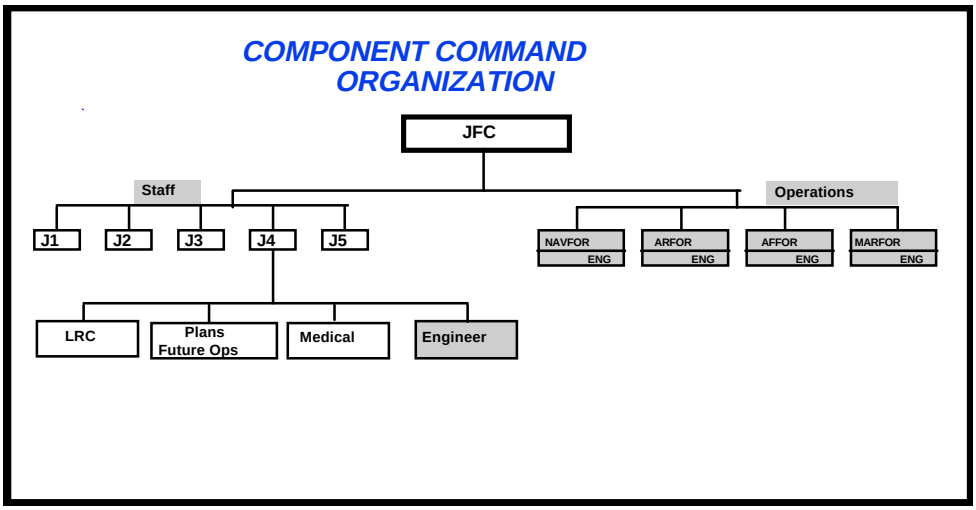

Figure II-1. Engineer Staff Under the J4 Component

b. **Engineer Mission Coordination**. Some joint force operations may be comprised of multiple, small,dispersed engineer missions requiring centralized coordination, but not intensive command and control. This structure typifies operations where engineer units are in general support of the joint force. These operations are best coordinated at the joint force engineer staff level. The joint force engineer staff provides mission assignments directly to the senior component engineer commander. The component commander retains command and control of his engineer forces.

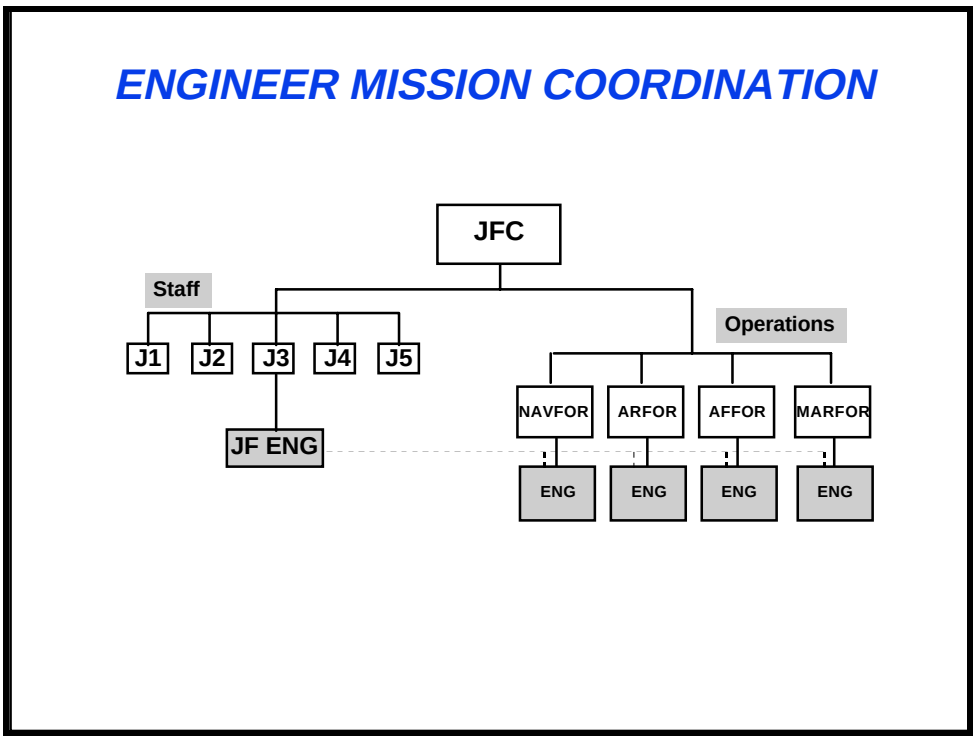

Figure II-2. Engineer Staff Under the J3 with Mission Tasking Authority to the Component Engineers

c. **Engineer Functional Command.** Many joint force operations are extremely engineer-intensive, requiring numerous engineer organizations to complete the multitude of tasks required for mission accomplishment. To consolidate requirements and better orchestrate forces, a joint force engineer command could be used to task-organize noncomponent level assets and provide the JFC a single point of control of multiple engineer organizations. This type of organization provides for a coordinated approach to address engineer responsibilities. This option is most applicable during large operations where multiple Service engineer organizations are in theater to support joint force requirements.

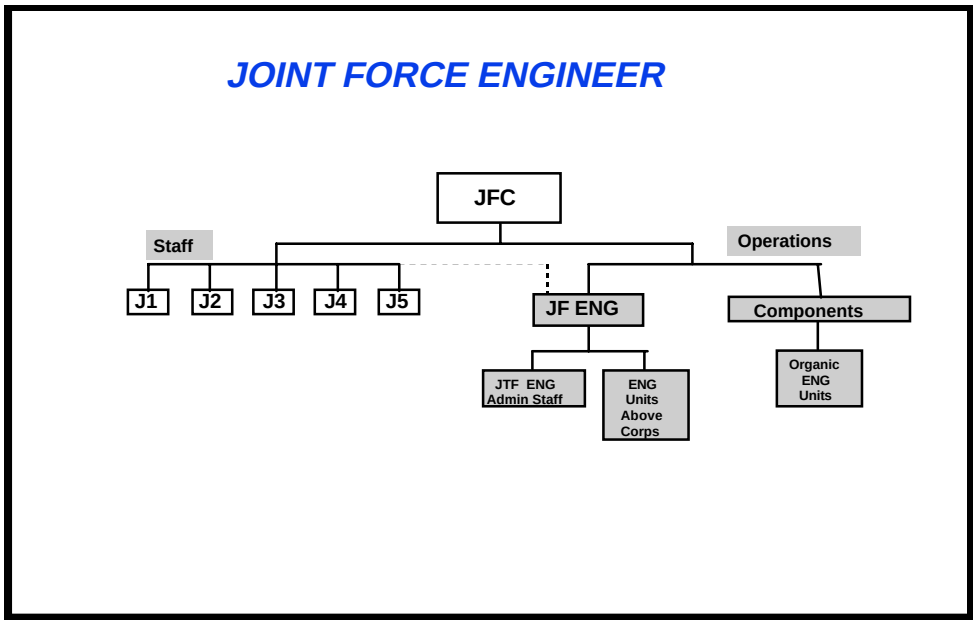

Figure II-3. Joint Force Engineer as the Joint Force Staff Engineer and as Commander of the Engineer Units Above Corps Level

3. **Conclusion**. The JFC establishes his staff and command relationships to meet the demands of the mission. The options presented in this chapter provide a framework for understanding the responsibilities of the engineer staff and its relationships within joint commands.

Chapter III

Planning

> No one starts a war—or rather no one in his senses ought to do so—without first being clear in his mind what he intends to achieve in that war and how he intends to conduct it.
>
> Clausewitz

1**. Planning Levels.** The challenges of planning successful engineer operations within diverse theaters are vast and varied. The engineer staff must be involved in planning from the initial stages of the process. Sound operational planning is vital to the mission success of deployed forces. Understanding how engineers affect each of the operating systems equips the planner with the background to form a comprehensive plan of engineer action. This universal application of engineers within all operating systems is crucial at the operational level. The omission of engineer considerations in any phase of the operation may adversely impact the entire plan. Engineer planning is done at the strategic, operational, and tactical levels.

> To be practical, any plan must take account of the enemy's ability to frustrate it; the best chance of overcoming such obstruction is to have a plan that can be easily varied to fit the circumstances met; to keep such adaptability, while still keeping the initiative, the best way is to operate along a line which offers alternate objectives.
>
> B. H. Liddell Hart

a. **Strategic and Operational Levels.** Combatant commanders' strategic engineer planning concepts focus on the relationship of terrain and theater infrastructure to the concept of operations. With combat engineering (mobility, countermobility, and survivability), topography, and general engineering functions in mind, engineer

planners must determine the basic, but broad, mobilization, deployment, and sustainment requirements of the combatant commanders' concept of operations. Operational planning merges the operational plan of the joint force, specific engineer missions assigned, and available engineer forces to achieve success.

b. **Tactical Level.** Service components are the primary planners at the tactical level.. The process includes detailed planning and involves the application of the best planning factors available from historical usage data, analysis, and exercise experience.

Operation Restore Hope in Somalia demonstrated how well joint engineer capabilities can be used to meet joint force requirements. Early planning identified a large military engineer requirement for both combat and construction support missions. Planners decided to use a mix of engineer capability from the US Army, Navy, Air Force, and Marine Corps. Time phasing of this support was well orchestrated based on available lift and mission requirements.

- US Air Force RED HORSE (rapid engineering deployable heavy operational repair squadron, engineers) airfield repair teams had been maintaining airfields throughout Somalia since 16 August 1992 in support of Operation Provide Comfort.
- A vertical construction detachment from the 40th Naval Mobile Construction Battalion (NMCB 40) (Seabee) opened up the Mogadishu airfield, and constructed troop bed down and logistics support facilities throughout Mogadishu on D+1.
- On D+5, a company of combat engineers from the 1st Marine Combat Engineer Battalion (1 CEB), 1st Marine Division, supported the expansion of Marine operations in Mogadishu by clearing obstacles and sweeping for mines. The battalion then supported Marine lodgment efforts in Baidoa, Baledogle, and Kismayo and began upgrading the road from Baidoa to Bardera.
- Elements of the Marine 7th Engineer Support Battalion (7th ESB) arrived offshore on D+5. The battalion augmented Seabee horizontal construction capability and constructed and operated redeployment facilities.

On D+7, Horizontal construction equipment from the 1st Naval Mobile Construction Battalion (NMCB 1) arrived along with command and control elements from the 30th Naval Construction regiment (30 NCR). NMCB 1 repaired airfields and constructed base camp facilities at outlying humanitarian relief centers, and opened up main supply routes (MSRs) out of Mogadishu. Joint Engineer forces also executed civic action projects as personnel, equipment and construction materiel resources allowed. Work included carpentry, electrical wiring, plumbing, and water -well refurbishing projects.

Operation Restore Hope

After Action Report

2. **Planning Considerations.**

a. **Commander's Intent.** A clear understanding of the commander's intent equips the engineer staff with the framework to participate in the development of viable courses of action (COA).

> In December 1992, the JTF engineer approached the JTF commander of Operation Restore Hope in Somalia to obtain the commander's intent and guidance on facility and road construction. He presented multiple options with varied construction standards. Each option had an associated resource requirement affixed to the level of work and an expected completion date.
>
> Operation Restore Hope
> After Action Report

b. **Planning Processes.** The particular procedures used in joint planning depend on the time available to accomplish them. Engineer considerations are sufficiently similar for both deliberate and crisis action planning to be addressed together. The two different methods of planning are described in JP, 5-0, "Doctrine for Planning Joint Operations" and JP 5-00.2, "Joint Task Force Planning Guidance and Procedures." Engineer considerations are outlined in the following phases of the planning process.

(1) **Situation Development**. The engineer contributes to situation development by providing digitized terrain data on the operational area. Additionally, the engineer gathers information on the infrastructure, terrain, and ongoing engineer activities as it relates to the operational area.

(2) **Assessment.** The engineer assesses the information gathered in order to provide the commander with information required to develop COAs. This information? includes the ability of the infrastructure to support operations, initial terrain visualization products, and mobility restrictions. A detailed analysis of the

enemy's engineer capabilities, time available, past practices, and doctrine also provides the JFC with a valuable tool to develop COAs, plans , and task organizations. The joint force engineer uses the assessment to determine the resources required for each COA, to make recommendations based upon available resources, and to tailor his forces to support the JFC's intent. This assessment is the linchpin of successful engineer integration into operations.

(3**) COA Development.** The engineer provides specific engineer tasks necessary to support each COA and provides options for joint force operational movement, maneuver, and protection from an engineer perspective. The development may include recommendations on intermediate staging bases (ISB), forward operating bases (FOB), avenues of approach, barriers and breaching, assembly areas, ports, and airfields. During this phase the engineer also evaluates the suitability, feasibility, acceptability, variety, and completeness of each COA and develops the initial engineer force structure for each time phased force deployment document (TPFDD).

(4) **COA Selection**. During COA selection the engineer analyzes and compares the different COAs. Criteria the engineer would evaluate during COA comparison are risk assessment, resource requirements, and mobility and survivability factors.

(5) **Execution Planning.** After the commander selects the COA, the engineer recommends the engineer force requirement to support the commander's intent. The engineer coordinates with other J staffs to identify both engineer requirements and support requirements to successfully accomplish the mission.

Operation Uphold Democracy in Haiti required one of the largest OCONUS deployments of engineer forces since the end of the Gulf War. The 20th Engineer Brigade from Fort Bragg, North Carolina, served as the headquarters for Task Force Castle, a joint engineer task force of over 2500 personnel. Task Force Castle spent almost two months in Haiti providing force bed-down, survivability, mobility, and general engineering support to a joint and combined force of over 20,000 soldiers, airmen, and Marines. The XVIII Airborne Corps was given overall authority for planning the intervention into Haiti. During the XVIII Airborne planning process, OPLAN X, a forced-entry operation was being parallel planned with OPLAN Y, a permissive -entry operation planned by the 10th Mountain Division with the 41st Engineer Battalion as the lead engineer element. On 11 September 1994 the 20th Engineer Brigade received an execution order for OPLAN Z, a merging of OPLANs X and Y **.** *While the conditions for the two operations differed significantly, many of the engineering specific issues remained the same including—*

- The military engineer end state
- Size of the engineer force.
- Upgrading/maintaining lines of communication (LOCs)
- Where the Force would live.
- Transition responsibilities

The flow of engineers into the theater was decentralized. Elements of the 41st Engineer Battalion conducted air assault operations into Haiti off the aircraft carrier USS Eisenhower. The battalion conducted an air assault into the international airport and port facility to clear and secure these facilities for follow-on forces. Engineer sweep teams cleared the main runway, apron and taxiway, while an element of the 1st Brigade Combat Team (1BCT), with sappers, cleared the port facility. After these missions were accomplished, engineers began force protection missions, constructing foxholes, fighting positions, berms and wire obstacles. Since there were no opposing force, engineer focus soon transitioned to base camp development and force bed-down in the joint operations area.

Task Force Castle
~~Engineer Magazine April 1995~~

(6) **Plan Development.** The engineer provides the appropriate sections or annexes of the plan, to include portions of the following annexes as found in CJCSM 3122.03, "Joint Operation Planning and Execution System, Volume II Planning Formats and Guidance."

- Annex A, Task Organization.

- Annex C, Operations.
- Annex D, Logistics.
- Annex L, Environmental Considerations.
- Annex M, Mapping, Charting, and Geodesy.

Operational planners should consider engineer actions to take during transition or termination. Development of an engineer end state and a clear understanding throughout the chain of command contributes to achieving desired political objectives after hostilities cease.

> Lieutenant General Johnston, the JTF commander during Operation Restore Hope in Somalia, established the standards for the area of operations and the end state for engineer activities. This end state became the bench mark for all US unilateral activities within the theater. The end state not only served as the initial negotiation point for the transfer of responsibilities from the US to the UN, but it also became the operational date for initiation of the retrograde of US personnel and equipment from the region.
>
> Operations Restore Hope
> After-Action Report

c. **Host Nation (HN) Forces**. Doctrines and operational competence as a result of training and experienceand types and quality of equipment and units can vary substantially among the military forces of host nations. When the situation permits, JFCs seek opportunities to improve the contributions of HN forces through training assistance and sharing of resources consistent with US and alliance or coalition terms of reference, such as the loan of American equipment (for example, radios, vehicles, or weapons). To facilitate matching missions with capabilities, JFCs implement measures to assess the capabilities, strengths, and weaknesses of HN forces.. Where HN forces have unique or special capabilities, they should be appropriately exploited. When using

HN forces, planners should consider the need for interpreters, force protection, operational security, and communications interoperability..

d. **Multinational Operations.** Military operations may often involve coalitions or alliances. Considerations applicable to HN forces apply as well to multinational formations. When assessing the strategic environment, combatant commanders consider international security agreements, formal and informal command relationships with-multinational forces, collective security strategies, global and regional stability, and regional interrelationships. United Nations resolutions may also provide the basis for operations and use of military force. JP 3-16, "Joint Doctrine for Multinational Operations," provides more information.

e. **Interagency Operations.** Many interagency organizations will participate or even lead activities in certain contingencies. JFCs should assure coordination of engineer assets with these agencies to create unity of effort and synergy and avoid duplication of effort. For example, during consequence management of a nuclear incident, engineers might be involved in cleanup, which requires close coordination with decontamination or monitoring elements of the Department of Energy (DOE). In such a case, the Office of Foreign Disaster Assistance (OFDA), in foreign settings, or the Federal Emergency Management Agency (FEMA), within CONUS, might be the approving authority for employment of resources. JP 3-08 " Interagency Coordination During Joint Operations," provides in-depth information on interagency operations.

> During Operation Uphold Democracy in Haiti, a Canadian-American Engineer Battalion, called the *Can-Am Engineer Battalion* was formed under the UN flag. In that unit the US provided the battalion-level command and control and the horizontal construction capabilities while the Canadians provided the vertical construction capability. This battalion did most of the bed down construction at multiple base camps around the country.
>
> Operation Uphold Democracy

3. **Engineer Considerations.** Each Service has established its engineer forces to meet its particular mission requirements. Each Service has a unique organizational structure. Army engineers can handle all facets of engineering. Naval construction forces primarily perform general engineering and provide construction support to Marine expeditionary forces. Air Force engineer units primarily provide general engineering to support Air Force operations. Marine Corps engineers are organic task-organized units that provide expeditionary combat and general engineering support to the Marine air-ground task force (MAGTF). The Army and Navy, acting as contract construction agents (CCAs) through the United States Army Corps of Engineers (USACE) and the Naval Facilities Engineering Command (NAVFACENGCOM), provide heavy construction support through contractors, real estate acquisition, design, and technical support for environmental activities. Appendix B provides additional information on CCAs.

a. **Battlespace Preparation.**

> Exact knowledge of the terrain regulates the dispositions of the troops and the order of battle. Knowledge of the country is to a general what a rifle is to an infantryman and what the rules of arithmetic are to a geometrician.
>
> Frederick the Great
> Instructions for his Generals

(1) **Geospatial Information.** Geospatial information, the foundation for battlespace visualization, is required for many military functions such as navigation, mission planning, mission rehearsal, targeting, and analysis. Engineerssignificantly aid in battlespace visualization, particularly through theater topographic assets, leading to identification and location of operational centers of gravity (both friendly and enemy). When geospatial information is coupled with threat analysis, weather, terrain, a friendly situation, and the logistics situation, the commander can more accurately view the battlespace. Accurate visualization of the area in which joint forces conduct operations allows commanders to plan for evolving situations. Engineer analysis contributes to—

- Development of maneuver options.
- Selection of high-payoff targets.
- Acquisition of precise, deep-target information.

(2) **Intelligence Requirements.** Engineer intelligence requirements need to be integrated into the joint force intelligence collection plan. The intelligence required varies with the size of the force, staff level, engineer unit, and mission. The basic principles for engineer intelligence are liaison with other engineer technical information and intelligence-gathering elements, brevity, accuracy, and timeliness. Some key engineer intelligence requirements include—

- Enemy engineer capability.
- Infrastructure information.
- Hydrographic information.

- Meteorological conditions.
- Topographic information.
- Bathymetric information.

On the nights of 26-27 December 1995, the waters of the Sava River rose in such a manner that the previous days work of the 502d Engineer Company (Assault Float Bridge) was submerged. As a result, the Operation Joint Endeavor time table for deployment of Task Force Eagle (TFE) suffered a serious setback. Thus, the nation's attention was focused on the critical float bridge crossing at the Sava River at Zupanja, Croatia. In order to successfully continue to conduct float bridge operations across the Sava, BG O'Neal (TFE) requested assistance from the commander of the Waterways Experiment Station (WES) to develop a river elevation prediction capability.

Within hours of that flooding, the WES, in Vicksburg, Mississippi, supported by the Topographic Engineering Center at Fort Belvoir, Virginia and the Cold Regions Research and Engineering Laboratory in Hanover, New Hampshire, established a Sava River Hydrologic Team that began building a computer model of the Sava River and deployed personnel into Croatia to gather data and assess host nation assets for data input to the model. By 30 December, based on early data, WES correctly predicted the river crest on 30 December.

Throughout Operation Joint Endeavor, the USACE team developed increasingly more sophisticated river stage predictions to support the ribbon bridge operations that were required for deployment, supply, and redeployment. Within a short time, WES established an electronic network of data information collection (including Sava River gage readings and weather data predictions from the Air Force's 7th Weather Squadron Detachment at Traben Trarbach, Germany), modeling (weather, snow pack/melt, and river hydraulics) and disseminated critical information and engineering advice. WES established a special page on its worldwide web site to provide river stage predictions every six hours to the engineer commander at the Sava River. That site also became an important mechanism for engineers and maneuver commanders to ask a wide range of engineer questions that could not be answered in theater. The ground commander was provided with a real time link to USACE expertise, using common commercial capabilities.

Operation Joint Endeavor

b. **Materiel Acquisition.** Engineers require a variety of materiel and incorporate the most cost effective acquisition strategy that meets the JFC's intent. Materiel may come from many sources, either procured locally or imported. Engineer planners should determine sources of engineer materiel and incorporate an acquisition strategy into the

plan. The CINC has the authority to issue and implement directives to transfer engineering functions between or among Service components within the area of responsibility (AOR) during war or military operations other than war. Even as forces transition from combat operations to postconflict activities, requirements for humanitarian assistance will emerge. Working with DOD and other US Government agencies, as well as NGOs, JFCs prepare to meet the requirements of humanitarian support. Preparation may include turning over materials and contract services to the host nation orother US Government organizations or NGOs.

c. **Operational Phases.** Current operations set the stage for future operations. Engineer planners need to consider follow-on phases in order to have sufficient force structure and materials in place to meet future operational requirements. Some engineer effort may need to start before the phase begins in order to meet the commander's objectives. Engineer planners must consider the following operational phases:

(1) **Prehostilities.** Close coordination with operators is required to ensure engineers are included in the TPFDD at the appropriate time to support operational objectives.

(2) **Lodgment.** Once deployed, engineers assist in establishing and maintaining the infrastructure necessary for sustaining military operations in theater.

(3) **Decisive Combat and Stabilization.** Engineers support maneuver by providing the capability to allow the joint force commander to fight where he will, go where he will, and use terrain as a weapon.

(4) **Follow-Through.** Engineers must continually assess the impact of overall operations on current engineer efforts for transition, termination (posthostilities), and redeployment efforts.

(5) **Posthostilities and Redeployment.** JFCs should identify posthostilities requirements as early as possible to best accomplish engineer missions and simultaneously redeploy assets no longer needed to resolve the crisis. During the planning and execution phase commanders must understand that redeployment can be a significant engineer challenge, particularly when terminating overseas contingencies. Engineers focus on constructing or repairing redeployment facilities and staging areas, to include wash racks and equipment-holding and customs-inspection facilities. Engineers also may—

- Conduct force-protection operations.
- Provide seaport and airport facilities maintenance.
- Clean up the battlefield.
- Maintain supply routes and facilities.
- Establish the HN infrastructure.
- Prepare forces for redeployment.
- Destroy enemy materiel and weapons.

d. **Environmental Effects.** When planning and conducting joint engineering operations, planners should consider not only their effect on the environment but also applicable US and HN agreements, environmental laws, policies, and regulations. The clear definition of environmental objectives is imperative. Planners should determine the optimal resource mix necessary to meet the objectives and evaluate any

shortcomings for resolution. To reduce the number of duplicate service providers and determine the level of necessary environmental support, planners should seek opportunities to optimize size, location, and type of environmental support facilities and their service areas.. Environmental considerations include—

(1) **Development, Use , and Protection of Potable Water Sources.** Water should be obtained or processed from approved sources. Operational and support elements shall not contaminate potable water sources.

(2) **Solid and Liquid Waste Management**. Disposal of solid and liquid waste will be in approved landfills or other areas that minimize environmental impact to the operational area.

(3) **Human Waste**. Existing sewage treatment and other waste-handling facilities should be used where possible. Expeditionary sewage collection and disposal should be sited and operated to minimize environmental impact if feasible.

(4) **Gray Water**. Effluent from showers and laundry facilities should be disposed of in a manner that reduces risk of contaminating ground water sources and eliminates pest habitats.

(5) **Hazardous Waste.** Hazardous waste should be collected, packaged, documented, and transferred to the Defense Logistics Agency (DLA) in accordance with established standards. If operational situations dictate that hazardous waste be abandoned, consolidation, rudimentary protection, and a record of the location, type of waste, and other pertinent information will assist future recovery operations.

(6) **Hazardous Material Management**. Hazardous material should be stored, transported, and used in a manner to preclude improper human or ecological exposure., Hazardous materials should be consolidated and reused when practical to reduce the amount of hazardous materials expended and waste generated.

(7) **Petroleum, Oils, and Lubricants**. POL products should be stored , transported and utilized in a manner which reduces releases into the environment. If an exigent operational necessity results in POL discharges , a record should be made of type, quantity, and location of discharge. JP 4-04 "Joint Doctrine for Civil Engineering Support" provides applicable DOD directives and policies regarding environmental stewardship.

> America's Army is constantly challenged as we approach the 21st century. How the Army meets the challenges and protects our most valuable resources-our soldiers and the environment-will determine the nation's future.
>
> Honorable Togo D. West, Jr.
> Secretary of the Army

e. **Funding and Resource Management.** Lack of knowledge of funding authorities, interpretations, and references can preclude provision of timely engineering support. The first critical step in initiating construction operations is understanding the necessary authorities and references, because without statutory authorization and appropriation of funds, DOD is not authorized to undertake construction or expend funds. Comptrollers, legal personnel, and engineers should be familiar with peacetime construction authorities and procedures. Personnel dealing with contingency/wartime construction must know and apply proper funding authorities and Service procedures.

Joint force engineer personnel should pay particular attention to funding authorities associated with—

(1) Construction in emergencies (USC Title 10 and 2803).

(2) Contingencies (USC title 10 and 2804).

(3) Exercises (USC Title 10 and 2805).

(4) War and national emergencies (USC Title 10 and 2808).

(5) Humanitarian assistance (USC Title 10 and 401).

(6) Foreign assistance (22 USC and 2292 and 2318).

(7) UN participation (22 USC and 2870).

The importance of understanding the funding process cannot be overstressed as the funding authority may dictate materials, methods, and approval procedure. JP 4-04, "Joint Doctrine for Civil Engineering Support," provides detailed information on construction funding and resource management authority and policy.

4. **Conclusion.** Anticipatory planning and involvement of the engineer staff in all aspects of planning is an absolute requirement. Successful engineer preparation of the theater depends upon the ready availability of units, equipment, and materiel. Engineers should be involved early in the planning of all phases of an operation.

Chapter IV

Operations

> Joint force commanders synchronize the actions of air, land, sea, space and special operations forces to achieve strategic and operational objectives through integrated, joint campaigns and major operations. The goal is to increase the total effectiveness of the joint force, not necessarily to involve all forces or to involve all forces equally.
>
> JP 3-0, "Doctrine for Joint Operations"

1. **Engineering Functions.** Engineer forces, in concert with other joint forces, enhance the commander's ability to conduct offensive or defensive operations by maximizing combat power, sustaining the force, achieving surprise, and using key terrain, airfields, or seaports. Engineer capabilities enhance the JFC's capability to move, maneuver, and achieve the objective with the least expenditure of time, materiel, and money.

> The power to maneuver, whether strategically or tactically, is essential to success. The side which, from any cause, loses the power of maneuver in strategical combinations will be at a disadvantage in the decisive battles. If it further loses the power of tactical maneuver, final defeat is inevitable.
>
> Note on Field Fortifications, 1914

a. **Combat Engineering.** Combat engineering encompasses functions shown in Figure IV-1 that facilitate mobility, countermobility, and survivability operations. Operational movement, maneuver, and force protection, key tenets of warfighting, require the support of the full spectrum of combat engineer capabilities. Combat engineering supports both offensive and defensive operations. For example, minefield missions can be both offensive and defensive, while enhancing joint force mobility, countermobility, and survivability.

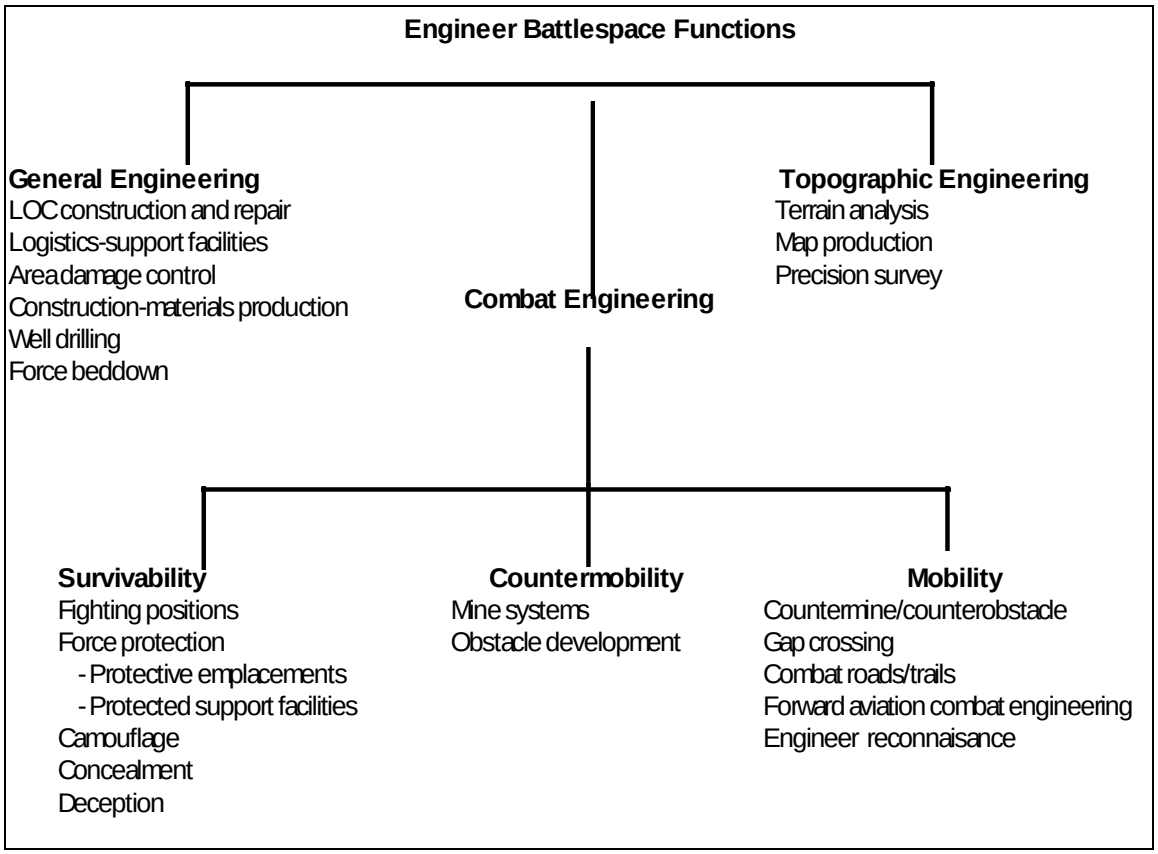

Figure IV-1 Engineer Battlespace Functions

(1) **Mobility.** Mobility enables the force commander to maneuver forces into advantageous positions. Mobility is enhanced through combinations of counterobstacle efforts, including countermine, gap crossing, forward aviation engineering, maintaining combat roads and trails, and engineer reconnaissance. At the operational level, the commander relies on mobility to achieve surprise, mass at the critical time, and maintain momentum. JP 3-15, "Joint Doctrine for Barriers, Obstacles, and Mine Warfare," details specific counterobstacle operations used to enhance mobility.

Operation Desert Storm provides an excellent example of operational mobility. As it became apparent that Saddam Hussein's forces were content to occupy Kuwait and brace for the liberating attack, CINC planners formulated the offensive plans for the sweep north, which included two Army corps. The end around Kuwait required the displacement of XVIII Airborne Corps from its defensive positions in Central Saudi Arabia to the northwest on the Iraqi border. Marshaling areas to upload track and road enhancements allowed for the rapid displacement of the corps into tactical assembly areas without providing Iraqi forces with even a hint of the coalition's intentions. Engineers aided in the breach of the elaborate defensive system Hussein's forces had emplaced, thereby allowing the tactical engineers to remain integrated with the maneuver force.

Operation Desert Storm

(2) **Countermobility.** Countermobility augments man-made and natural terrain with obstacle systems to support the JFC's concept of operations. This adds depth to the battle in space and time by attacking the enemy's ability to maneuver its forces. With its movement disrupted, turned, fixed, or blocked, the enemy is vulnerable to US forces. Engineers ensure obstacle integration through the proper exercise of obstacle C^2, focusing on obstacle-emplacement authority and obstacle control. The engineer must be part of the JTCB to prevent destruction of key infrastructure and provide guidance concerning emplacement of obstacles, barriers, and mines. JP 3-15, "Joint Doctrine for Barriers, Obstacles, and Mine Warfare," identifies many specific engineer operations used to limit or hamper the enemy's ability to maneuver. For land operations, these include—

- Land mines (conventional and scatterable).
- Unexploded ordnance obstacles (surface and air-delivered).
- Demolition obstacles (preliminary and reserved).
- Nuclear effects.
- Flame field expedients.

> It is certain that in future wars, even more than in the past, endeavors will be made by every possible means to prevent or delay the march of the enemy's troops by throwing obstacles in the way and by cutting such lines of communications as they might use.
>
> Military Demolition's
> 1st Lieutenant Douglas MacArthur

(3) **Survivability.** To support survivability operations, engineers provide concealment, camouflage, deception, and protection from the effects of enemy weapons and counter enemy intelligence operations. In joint operations, force protection is a principal concern of leadership at all command levels**.** Regardless of the scenario, commanders employ engineers to safeguard the force. Engineers help maneuver forces build bunkers, wire obstacles, and protective berms.

b**. Topographic Engineering.** Military operations require topographic support. Missions associated with these operations can be preplanned in peacetime or they can evolve from battlespace situations. Each response is variable and tailored to the tactical situation and the geographic area of operation (AO). Topography provides commanders with information about the terrain, which improves visualization of the battlespace and situational awareness by identifying—

- Avenues and routes for friendly forces as well as likely enemy advance routes.
- Obstacle-zone locations.
- Engagement areas
- Unit positions.
- Maneuver options.
- High-payoff targets.
- Deep-target information

c. **General Engineering.** General engineering tasks may be performed in direct support of combat operations, such as roadway and airfield damage repair. General engineering operations are described in detail in JP 4-04, "Joint Doctrine for Civil Engineering Support." These operations include both horizontal and vertical construction, characterized by high levels of design, construction methods, planning, and preparation.

> Military road making will, in most cases, be a question of repairing existing roads to make them temporarily passable, the work to be done in the shortest possible time.
>
> Engineer Field Manual, 1917

2. **Engineer Operations in Wartime.**

a. **Theater Preparation.** During wartime, engineers assist in preparing the theater by providing support for intelligence, isolating the enemy, and acquiring necessary real property.

(1) **Intelligence-Preparation-of-the-Battlespace.** Engineers play a major role in the intelligence-preparation-of-the-battlespace (IPB) process. Engineers anticipate and provide terrain products of likely contingency areas to support IPB. Engineers assess available infrastructure for possible general engineering requirements, including airfields, main supply routes (MSRs), ports, utilities, and logistics facilities. Engineer reconnaissance operations provide current battlespace information that help the commander plan and conduct tactical operations.

> Tactics are based on weapon power; strategy is based on movement; movement depends on supply.
>
> J.F.C. Fuller
> *The Generalship of Ulysses S. Grant*

(2) **Isolation of the Enemy.** Engineers use countermobility operations to isolate the enemy by stripping away as much enemy support or freedom of action as possible. Topographic engineering operations also contribute to isolating the enemy by identifying likely avenues of approach and priority targeting information.

(3) **Acquisition of Real Property.** Regardless of the operational scenario, e.g., war or MOOTW, acquisition of real property is necessary. Real property is acquired through host nation support agreements, leases, or new construction. USACE and NAVFACENGCOM support leasing and construction activities as discussed in Appendix B.

(4) **Maintenance of Theater Access.** The CINC is responsible for planning coordination, programming, and construction of facilities within the command. Engineers support the CINC's guidance through deployments for training and nation assistance that focus on preparing a future battlespace. Examples of these types of engineer operations include, water well drilling, pre-positioned war reserve material site construction, airfield upgrades and expansions, and port facilities construction.

b. **Warfighting Operations.** An understanding of the capabilities and strengths of individual Service and coalition engineer forces enhances mission success. Engineers contribute to a myriad of operations, to include—

(1) **Forcible Entry.** Engineers clear beaches, roads, and airfields to facilitate insertion of early entry forces. Limited construction may be performed to enhance beach egress during an amphibious assault.

(2) **Permissible Entry.** After initial clearance of beaches, roads, and airfields, engineers improve these areas to facilitate entry for follow-on forces.

(3) **Littoral Operations.** Engineers clear and breach obstacles from the high-water mark to the objective area. Engineers can make improvements to beach and port facilities to enhance cargo and personnel throughput. For further discussion see JP 3-15.

(4) **Sustained Action on Land Operations.** Engineers conduct combat engineering, general engineering, and topographic engineering to support the joint force.

(5) **Sustained Action at Sea Operations.** Engineers construct and maintain advanced logistic support sites (ALSS) required to support ships at sea.

(6) **Sustained Action from the Sea.** Engineers support joint logistics over the shore (JLOTS) operations by operating lighterage to offload ships in stream, construct elevated causeway (ELCAS) systems, and improve beaches to increase cargo throughput. Engineers also support sea-delivered bulk fuel and water systems such as the Offshore Petroleum Discharge System (OPDS) and Amphibious Assault Fuel System (AAFS).

(7) **Airbase Sustainment Operations.** Engineers operate and maintain forward-deployed airbase facilities, provide crash fire rescue and explosive ordnance disposal (EOD)

(8) **Battle Damage Repair.** Engineers perform base recovery after attack and critical infrastructure repairs to include MSRs, airfields and port facilities, and utilities systems.

On 9 December 1992, an amphibious landing of US Marines in Mogadishu signaled the beginning of Operation Restore Hope. It also ushered in a new era in US military engineering operations—support of humanitarian relief. US Central Command led the execution of Operation Restore Hope. US forces in Somalia provided a secure environment for civilian relief workers to distribute aid. Engineering operations, e.g., construction, road improvements, etc. played a significant role in Operation Restore Hope .

Joint Task Force for Operation Restore Hope,
Center for Naval Analysis, CRM 93-114, March 1994

3. **Engineer Support to MOOTW.** MOOTW can be more engineer focused than warfighting operations. The versatility of engineers provides the JFC with capabilities to support the joint force and conduct engineer operations that contribute directly to stability. Many MOOTW occur in areas of the world that lack sufficient infrastructure to support contingency forces, requiring much of the force's sustainment system to be brought to the AO. The jont force engineer provides guidance to the JFC to assure engineer missions receive the right mix of support on time. Engineer forces and material usually compete with other forces being sent in to stabilize the situation.

Operations in Somalia saw Air Force RED HORSE engineers rebuilding airfields, Marine engineers clearing and proofing mines, Navy Seabees drilling wells and building base camps, and Army engineers improving MSRs and base camps

a. **Principles.** Engineer operations support several basic principles in MOOTW.

(1) **Objective.** Engineers assist the commander in developing a clearly defined, decisive, and attainable military objective by assessing the engineering assets and capabilities available to meet the objective.

(2) **Unity of Effort.** Within a joint force, engineers may operate with other governmental, nongovernmental, and international agencies and organizations participating in the operation. Given the multitude of organizations and capabilities

involved, it is important that the engineer coordinate with these organizations to ensure resources are focused on accomplishingt the mission.

> Commanders and staffs must work with the local civilian leadership early in the process to establish work priorities. Local fire, police, water, sewage, electrical, and telephone service agencies all play critical roles in reestablishing order and control. Be sure to also consult relief agencies such as the Red Cross, Salvation Army and United Way to help identify priorities.
>
> *Engineer* Magazine April 1994
> "Lessons Learned: Operations Other Than War"

(3) **Security.** Engineers contribute to force security across the entire range of MOOTW. Engineers may execute projects that range from basic physical security, such as perimeter lighting, to force protection such as bunkers and fighting positions. Engineers also contribute to the security of deployed forces by recommending base camp siting that considers natural and enemy threats.

> Army engineers built six 500-man base camps in Somalia during Operation Restore Hope. Facilities in general were both semipermanent and permanent. One of the considerations was providing force sustainment facilities for follow-on UN peacekeeping forces in addition to current demands. This included well drilling, showers, latrines, contracted laundry, etc. However, initial units deployed with minimal Class IV and little engineer equipment due to aircraft limitations. In addition, there was limited Class IV material on pre-positioned ships. This limited the timely construction of support facilities and created force protection problems due to inadequate barrier materials.
>
> Operation Restore Hope
> After-Action Report

(4) **Restraint.** Rules of engagement (ROE) are likely to be more restrictive than in war. The engineer should be involved in the development of ROE in order to recommend appropriate engineer support to security measures commensurate with the level of restraint

(5) **Perseverance.** MOOTW by their very nature are unpredictable. Engineers must be prepared to extend their stay and prioritize changing missions. Therefore,

as they perform their operations, thought must also be given to both teardown and further buildup of forces.

b. **Operations Outside the US.** JP 3-07, "Military Operations Other Than War," describes military operations associated with MOOTW. In certain types of MOOTW, engineers directly support and are often the primary effort of the operation, particularly in emergency relief under foreign humanitarian assistance (FHA) and humanitarian civic assistance (HCA). In these types of MOOTW, important engineer capabilities that directly support the JFC's mission include repair of key infrastructure such as roads and utility systems, construction of displaced person base camps, drilling of wells, construction of basic sanitation facilities, and construction of rudimentary surface transportation systems and public facilities. Engineer capabilities for rapid response and their ability to work with host nation forces are especially effective to quickly mitigate human suffering and stabilize a situation.

c. **Domestic Support Operations (DSO).** The predominant form of DSO for DOD is disaster response under the Federal Response Plan (FRP) managed by FEMA. Engineers are part of the primary effort in major disaster response operations. Under Appendix X of the FRP, USACE is the lead planning and operating agent for emergency support function 3 (ESF #3), engineering and public works. Engineer units provide critical response capabilities for emergency debris clearance on critical access routes, emergency power to public facilities, and emergency repairs to public facilities.

d. **Civil Augmentation.** During MOOTW, contracting through civil augmentation programs like the Army's Logistics Civil Augmentation Program (LOGCAP), the Air Force's Contract Augmentation Program (AFCAP), and the Navy's Construction

Capabilities Contracts (CONCAP) can play a significant role in providing engineer support to accomplish the mission. JP 3-07, "Military Operations Other than War," describes the types of military operations associated with MOOTW. Regardless of the MOOTW operation, carefully planned, supported, and executed engineer support using a balanced mix of engineer capabilities will enhance the success of the MOOTW.

4. **Posthostilities Operations (PHO).** Military engineer operations support the transition to PHO. Engineer operations may become the focal point for these operations. Engineers contribute to PHO by—

- Executing environmental restoration projects, e.g., waste collection sites, marking mine fields and UXO.
- Constructing redeployment facilities, e.g., wash racks, customs inspection facilities.
- Repairing infrastructure, e.g., damaged MSRs, host nation facilities.Engineers may also engage in improvements to local infrastructure to support a more rapid transition to civilian control, e.g., civil action projects, host nation assistance projects.

a. **Battle Damage Repair.** Engineers may be tasked to repair facilities and infrastructure damaged by actions of war or neglect caused by war. For political and good will considerations, US or coalition forces may be tasked to repair damage to property or structures that may be used by the host nation government to provide a means of livelihood for the general population. More permanent repairs can be planned and executed as the PHO phase continues and as mission requirements warrant. The scope of PHO construction must be carefully managed to stay within the funding and construction personnel cap levels.

b. **Infrastructure Improvements and Restoration.** Construction of infrastructure improvement projects may be completed by military construction forces alone or in conjunction with civilian contractors. Infrastructure improvements may be required to prevent widespread disease, flooding, or fire damage from occurring. They may also be needed to restore commerce. Infrastructure improvements may benefit US and coalition forces if PHO include substantial forces remaining in the country after conflict ceases.

5. **Specialized Engineer Functions.** Service component engineers have unique capabilities above and beyond what is considered typical engineering. Appendix A provides details on the functions and capabilities of Service engineer units. Examples of unique functions that specialized engineer units can perform include—

- Port openings.
- Fire protection and crash rescue.
- Underwater Construction/Salvage.
- Water well drilling.
- Pipeline construction.
- Bridging.
- EOD.
- Prime power.
- Real estate acquisition.
- Quarry operations.
- Batch plant operations.

6. **Conclusion.** Engineer operations are diverse and cover the entire spectrum of the battle space. They conduct combat engineer missions from the forward edge of the AO to general engineer tasks in the rear area. Engineer operations are critical to ensure the JFC's operational movement, maneuver, and force protection objectives are achieved.

Appendix A
Joint Engineer Capabilities

1. **Introduction.** As Air Force, Army, Navy, and Marine Corps engineers are being called upon to operate jointly during wartime and MOOTW a clearer understanding of Service engineer capabilities will allow commanders to tailor the engineer force for the mission/operation. Engineers not only operate jointly, they are also called upon to operate with multinational engineers, civilian contractors, US Government agencies, NGOs, PVOs, and IOs. Commanders must fully understand joint, multinational, and interagency engineer capabilities in order to integrate them into operational and tactical planning as well as provide engineer support. This appendix provides a brief description of engineer unitcapabilities and civil augmentation programs and their capabilities.

2. **Task Priority and Capability Codes.** Capabilities are based on individual Service standards and are not intended to be used to compare capabilities between Services. Figure A-1 defines the codes for use with matrix in Figure A-2. The Service engineer capabilities matrix in Figure A-2 shows Service engineer capabilities with respect to each Service's requirements.

ENGINEER UNIT ABBREVIATIONS

Marine Corps

CEB	Combat Engineer Battalion
ESB	Engineer Support Battalion
MWSS	Marine Wing Support Squadron

Navy

NMCB	Naval Mobile Construction Battalion
ACB	Amphibious Construction Battalion
CBMU	Construction Battalion Maintenance Unit

Army

HVY	Engineer Combat Battalion (Heavy)
CBT	Engineer Combat Battalion
ABN	Engineer Battalion (Airborne)
CSE	Engineer Combat Support Equipment Company

The CSE is but one equipment-intensive company in the Army; recommend one category that covers all specialized companies or lists all the companies

Other Other

Air Force

RH	RED HORSE
PB	Prime BEEF
Other	Other, e.g., firefighters, explosive ordnance disposal

Service Engineer Capability Codes

First Letter		Second Letter	
P	Primary Task	**H**	Heavy Capability
S	Secondary Task	**M**	Medium Capability
N	Not a Task	**L**	Low Capability
		N	No Capability

Notes:

1. Fully capable with proper augmentation units
2. Usually done to support Air Force Prime BEEF units

Army and Navy engineers are capable of performing all mobility, countermovbility , survivability, general engineering, utilities, and bulk fuel support to varying degrees. However, units that emplace general utilities and bulk fuel are most generally very specialized companies that need to be specifically requested, for example, quarry operations, well drilling, and port/waterfront construction.

Figure A-1. Service Engineer Capability Codes

	MARINES			NAVY			ARMY					AIR FORCE		
	CEB	ESB	MWSS	NMC	ACB	CBMU	HVY	CBT	ABN	CSE	Oth	RH	PB	Oth
MOBILITY TASKS (Combat Support)														
Conduct Engineer Recon	PM	PM	PL	NM	NL	NN	PL	PH	PH	PH	NN	NL	NL	NN
Breach Obstacles	PH	SM	NL	NM	NN	NN	SM	PH	PM	PH	NN	NL	NN	NN
Construct Pioneer Roads	PH	SH	SL	SH	NN	NL	PH	PH	PL	PH	NL	NL	NN	NN
Assault Bridging	PL	SL	NN	NN	NN	NN	NN	PH[1]	NN	PH[1]	NN	NN	NN	NN
Clear Mines	PH	SH	SL	NN	NN	NN	SL	PH	PM	SL	NN	NL	NN	SM
Clear Helo Landing Fields	PM	PH	SL	SH	NN	NL	PH	PH	PM	PH	NL	PH	PM	NN
Improve Beaches	PH	SH	NN	PH	SL	NL	SL	PH	PL	PH	SM	NL	NN	NN
Employ Special Demolitions	PH	SH	NL	NL	NN	NN	SM	PH	PH	SL	SL	SL	NN	SL
Fight as Infantry	SM	NL	NN	SL	NN	SL	NN	SH	SH	SL	NN	SL	SL	NN
COUNTERMOBILITY (Combat Support)														
Conduct Engineer Recon	PM	PM	PM	NL	NL	NN	PL	PH	PM	PH	NN	NL	NL	NN
Place Mines	PH	SH	SL	NN	NN	NN	SL	PH	PM	SL	NN	NL	NN	NL
Plan/Install Obstacles	PH	SH	SL	NH	NL	NL	SH	PH	PH	PH	NN	SM	SM	NN
Special Demolitions	PH	SH	NL	NL	NN	NN	SM	PH	PH	SL	SL	SL	NN	SL
Fight as Infantry	SM	NL	NN	NL	NN	NL	NN	SM	SM	SM	NN	SL	SL	NN
SURVIVABILITY TASK (Combat Support)														
Construct Field Fortifications	PH	PH	PM	SH	NN	NN	PH	PH	PM	PH	NN	SM	SL	NN
Employ Special Demolitions	PH	PH	NL	NL	NN	NN	SL	PH	PL	PH	NL	SL	NN	SL
GENERAL ENGINEERING TASKS (Combat Service Support)														
a. General Engineering														
Conduct Engineer Recon	SM	PM	PL	PM	NL	NL	PH	PH	PH	PH	SM	PM	PM	NN
Surveying & Drafting	SL	PM	PL	PH	NN	NL	PH	SM	SL	SM	NN	PH	PH	NN
Plan Construction, Repair and Maintain Camps	SL	PH	PM	PH	NL	PM	PH	SL	PM	SL	PM	PH	PH	NN
Improve Beaches	SL	PH	NL	PH	PM	NN	SM	SL	SL	SL	PM	NM	NL	NN
Rapid Runway Repair	NN	SM	PM	SM	NN	SL	PH[2]	NN	SM	SM[2]	NN	PH	PH	NN
Improve Bare Base Airfields	NN	PH	PM	SM	NN	SL	PH[2]	NL	PM	SM[2]	SM	PH	PM	NL
Build Expedient Airfields (Matting)	NN	PH	SL	PH	NN	NN	PH	SM[2]	PM	NN	NN	PH	PM	NN
Plan & Estimate Projects	PM	PH	PM	PH	NL	SL	PH	PL	PM	PM	PM	PH	PH	NN
Materials Testing	SL	PM	PL	PH	NN	NN	PM	NN	PM	PL	NL	PH	SL	NN
Soil Stabilization	SL	PH	PL	PH	NN	NL	PM	NN	PL	PM	NN	PH	SM	NN

1

Figure A-2. Service Engineers Capability Matrix

	CEB	ESB	MWSS	NMC	ACB	CBMU	HVY	CBT	ABN	CSE	Oth	RH	PB	Oth
Construct Aircraft Revetment/Dispersal	NL	SH	PM	SH	NN	NL	PH	NM	PM	NM	NL	PH	PM	NN
Repair Airfield Damage	NL	PH	PM	PH	NN	NL	PH	SL	PL	SM	NL	PH	PH	NN
Engineer Design - Deliberate	NL	PH	SL	PH	NL	NL	PH	NL	PL	NL	NN	PH	PH	NN
Pile Driving	NN	PM	SL	PL[1]	PM	NN	PH	NN	SL	PH	PH	NN	NN	NN
Repair War Damage	NL	NM	NL	SH	NN	PL	PH	SM	SM	SM	PM	PH	PH	NN
Drill Wells	NN	NN	NN	PH	NN	NN	SM	NN	SM[1]	SM[1]	PH	PH	NN	NN
Construct Semipermanent Camps	NL	PH	SL	PH	NL	NN	PH	SL	SL	NN	SL	PH	PM	NL
Erect Pre-Engineer Structures	NL	PH	PL	PH	NN	NL	PH	NL	NL	NL	PM	PH	PH	NL
Hard Surface Staging Areas	NN	NN	NN	PH	NN	NL	PH	NN	NN	NM	NN	PH	PH	NN
Perform Vertical Construction	NL	PM	PL	PH	NN	NL	PH	NL	SL	NL	PM	PH	PM	NN
Asphalt Roads	NN	NN	NN	PH	NN	NN	PM	NN	NN	NN	PM	PH	NL	NN
Operate Central Power Plant	NN	NN	NN	PM	NN	PM	NN	NN	NN	NN	PH	SL	SL	NN
Perform Base Maintenance	NL	SM	SL	SH	NN	PH	SM	NL	NL	NL	PM	SH	PH	NN
Quarry Operations	NL	SM	NL	PL[1]	NN	NN	NN	NN	NL	NL	PH	PH	NN	NN
Rock Crusher Operations	NN	SM	NL	PL[1]	NN	NN	NL	NN	NL	NL	PH	PM	NN	NN
Construct Logistical Support Bases	NL	PH	NL	PH	PH	NN	PH	NL	PL	NL	SM	SM	SL	NN
Construct Air Bases	NN	PH	NN	PH	NN	NN	PH	NN	NL	NM	NN	PH	PM	NN
Construct & Repair Port/ Waterfront Structures	NL	NM	NL	PL[1]	NL	NN	SL	NN	NN	NH[1]	PH	SM	SL	NN
Employ Special Demolitions	NH	PH	NL	PH	NN	NN	SL	PH	NN	PH	SM	SL	NN	SL
Nonexplosive Demo and Obstacle Removal	NL	PH	NL	PH	NL	NN	PH	PH	PM	PH	SM	SM	SL	SM
Fight as Infantry	NM	SL	NN	SM	NN	PL	NN	SH	SH	SL	NL	SL	SL	NN
b. Utilities Support														
Tactical Water/Hygiene Services	SL	PH	PM	PH	NN	NL	NN	NN	NN	NN	NN	SM	SL	NN
Tactical Electrical Supply	SL	PH	PM	PH	NN	NL	NN	NL	NL	NL	PH	PM	PL	NN
Develop Sewage and Water Systems	NN	NL	NL	PM	NN	NN	NN	NN	NN	NM	NN	PM	PL	NN
c. Bulk Fuel Support														
Provide Bulk Fuel Storage & Dispersing	NN	PH	PM	NL	PH	NN	NN	NN	NN	NN	PH	PM	PL	NN
d. Hydro Survey	NN	NN	NN	PH	NN	NN	NN	NN	NN	NN	PH	NN	NN	NN
e. Underwater Const/Maint	NN	NN	NN	PH	NN	NN	NN	NN	NN	NN	PH	NN	NN	NN
f. Crash Rescue	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	PM	NN	NN	PH
g. Firefighting	NN	NN	NN	NN	NN	NN	NN	NN	NN	NN	PM	NN	NN	PH

Figure A-2. Service Engineers Capability Matrix (continued)

3. **Engineer Organizations.**

a. **Air Force.** The Air Force's engineer capability is organized into two types of forces:

- Prime base engineer emergency force (BEEF).
- Rapid engineering deployable heavy operational repair squadron, engineers (RED HORSE).

These forces provide, operate, sustain, and recover bases in a wide range of geographic locations.

(1) **Prime BEEF.** Prime BEEF forces are primarily organized into multidisciplined lead and follow teams (engineers, fire protection, explosive ordnance disposal, and readiness personnel) ranging in size from 132- to 61-person teams, respectively. Prime BEEF teams are manned to rapidly augment theater base civil engineer forces, to work in combination with other teams at collocated operating bases or bare bases, or to form complete base civil engineer organizations (base operations and maintenance units) where none previously existed. While Prime BEEF forces are equipped with team and individual tool kits, they rely on the availability of in-place or pre-positioned theater equipment, vehicles, and supplies. Forces are deployed with initial emphasis on the bedding down of forces. Special attention is on siting, operation, and maintenance of—

- Harvest Eagle (facilities for bare base living and working, that do not provide many flightline support assets intended for use in Europe and the Pacific).
- Harvest Falcon (complete facilities for long-duration, bare-base flying and support operations intended for use in Southwest Asia).

The Air Force Civil Engineer Support Agency Guide to Bare Base Assets provides additional information.

(2) **RED HORSE.** RED HORSE squadrons are 400-person, self-sufficient units manned and equipped to provide highly mobile, rapidly deployable echelons to support force beddingdown requirements and to repair war damage. These squadrons provide necessary support for siting and installation of air-transportable facilities and equipment. Special capabilities include water well drilling, explosives demolition, quarry and paving operations, aircraft arresting systems installation, airfield lighting, and air base siting and development. RED HORSE squadrons have their own required heavy equipment, tools, and a limited number of rations. RED HORSE squadrons should be specifically identified in civil engineer support plans for large beding-down projects. During the first 30 days of an anticipated operation, pre-positioned or indigenous equipment is required.

b. **Army.** The Army has a wide variety of engineer units at division, corps, and theater levels that provide the technical capabilities required to accomplish essential, diversified tasks throughout the depth of a theater. Army doctrine distributes these units throughout the theater and assigns them to major subordinate commands, so that engineers can be responsive to commanders at all echelons. Engineer organizations range in size from team to battalion (and brigade within heavy divisions), with three levels of headquarters units (group, brigade, and engineer command). They include specialized functions such as well-drilling, real estate management, diving, quarrying, and firefighting, as well as the more standard mission of providing mobility, countermobility, and survivability (M/CM/S) enhancements.

(1) **Engineer Organizations at Division Level.** The senior engineer headquarters in the division provides C^2 of staff planning for, and supervision of, engineer units that are assigned, attached, or supported by the division. The senior engineer advises the division commander and staff on engineer operations and the impacts on division operations. The headquarters plans and coordinates engineer operations for units constructing tactical obstacles, defensive positions, and fixed and floating bridges; breaching or clearing obstacles; and conducting river-crossing operations. Engineer units at divisional level break into two typical organizations:

(a) **Heavy Division.** A heavy division has a headquarters and headquarters detachment (HHD) and three engineer combat battalions. The combat battalions provide support to each of the three maneuver brigades in the division.

(b) **Light Division**. A light division that has only one battalion consisting of a headquarters and headquarters company (HHC) and three engineer combat companies. The combat companies provide support to each of the three maneuver brigades in the division.

(2) **Engineer Organizations at Corps Level.** At corps level the engineer brigade provides C^2 of staff planning for, and supervision of, engineer units assigned, attached, or supporting the corps. The brigade—

- Plans and coordinates the operations of engineer units engaged in combat service, construction, and rehabilitation of facilities to support the corps.
- Plans activities relating to river-crossing, barrier-placement, and counterobstacle and countermine operations.

- Supervises engineer units that construct and rehabilitate roads, combat roads and trails, structures, tactical airfields facilities, and petroleum-storage facilities.
- Provides an engineer staff element and supervises the development of terrain visualization products and topographic operations to the corps headquarters.

Depending on the number of engineer units attached to the corps, one or more engineer groups may be assigned to the brigade. A group is capable of providing C^2 for two to five engineer battalions, including separate companies. All units assigned to the corps can be further assigned to the divisions to reinforce organic engineer units as required. The following units would usually work at corps level:

(a) **Engineer Combat Battalion, Corps.** The corps battalions come in four different types: airborne, light, mechanized, and wheeled. These battalions are normally assigned to a group headquarters. The number of battalions allocated is based on the number and types of divisions allocated to a corps. An engineer combat battalion consists of one HHC and three line companies. Each type of unit has unique capabilities to support a particular type of division.

(b) **Engineer Combat Support Equipment (CSE) Company.** This company performs survivability and countermobility tasks; general engineering along MSRs and combat trails in corps close-operation areas; and general-engineering, survivability, and countermobility operations in the corps area. The normal allocation is based on the number of combat wheeled and mechanized battalions assigned in the corps AO. The company augments

corps battalions and performs assigned tasks such asconstruction, rehabilitation, repairs, maintenance, and modification of landing strips, airfields, CPs, MSRs, and LOCs.

(c) **Engineer Company Light Equipment (LE).** This company augments engineer operations with capabilities to support airborne, air assault, and light operations with engineer equipment that is downsized and rapidly deployable. The company performs survivability and countermobility tasks; general engineering along MSRs and combat trails in corps close-operation areas; and general engineering, survivability, and countermobility operations in the corps area. The normal allocation is based on the number of airborne, air assault, or light corps battalions assigned in the corps AO. The company augments engineer battalions in early deployment with force-projection forces to establish forward logistics bases until heavier corps and theater engineer assets arrive. The company performs assigned construction, rehabilitation, repairs, maintenance, and modification of landing strips, airfields, CPs, MSRs and LOCs.

(d) **Multirole Bridge (MRB) Company.** This company provides personnel and equipment to transport, assemble, disassemble, retrieve, and maintain bridging assets at one or multiple bridge sites.

(3) **Engineer Organizations at Echelons Above Corps (EAC).** At EAC,, the engineer command (ENCOM) provides C^2 of staff planning for, and supervision of, engineer units assigned at EAC. The following units are found at EAC:

(a) **Engineer Battalion (Combat Heavy).** This large battalion is capable of performing both horizontal and vertical construction. It is composed of a headquarters support company (HSC) and normally three line companies. The combat heavy battalion is most

often used as an EAC asset, but is commonly task organized at corps level due to its versatility and availability.

(b) **Engineer Battalion (Prime Power).** This battalion consists of an HHC and two line companies. It generates nontactical electric power and provides advice and technical assistance on all aspects of electrical power and distribution systems to support military operations to meet large military power requirements.

(c) **Engineer Battalion (Topographic).** This battalion consists of an HHC and two companies. One of the companies supports a corps and the other provides support at EAC.

(d) **Engineer Construction Support Company**. This company augments the combat heavy battalion with additional horizontal construction capabilities. It provides construction support equipment and personnel for rock-crushing, bituminous mixing and paving, and major horizontal construction projects such as highways, storage facilities, and airfields.

(e) **Engineer Dump Truck Company.** This company augments the combat heavy battalion with additional dump trucks for moving bulk materials to support other engineer units.

(f) **Engineer Pipeline Construction Company.** This company augments the combat heavy battalion with additional technical personnel and specialized equipment to construct and rehabilitate pipeline systems.

(g) **Port Opening Company.** This company augments the combat heavy battalion with specialized engineer support to develop, rehabilitate, and maintain port facilities, to include support for LOTS operations.

(h) **Engineer Team, Diving.** This team provides diving expertise and scuba support and has specialized equipment and personnel for deep-sea diving and heavy salvage operations. Diving is done to support light salvage, harbor clearance, underwater pipeline, fixed bridge, and port construction repair and rehabilitation operations. The team conducts underwater reconnaissance and inspections.

(i) **Engineer Team Firefighting.** This team provides support with three types of firefighting trucks: brush, fire, and water trucks.

(j) **Engineer Team Quarry.** This team provides construction support by providing equipment and personnel for rock-crushing and major horizontal construction projects such as highways and airfields.

(k) **Engineer Team, Real Estate.** This team performs functions related to acquiring, using, and disposing of real property for military purposes. The team augments the USACE contingency real estate support team (CREST) in acquiring and disposing of real estate.

(l) **Engineer Team, Utilities.** This team provides limited facilities engineering support in the areas of carpentry, masonry, electrical, plumbing, and road maintenance and repair.

(m) **Engineer Team, Well Drilling.** This team provides personnel and equipment for drilling and developing water wells.

c. **Marine Corps.** The Marine Corps is organized into Marine expeditionary forces (MEF), each of which contains a division, an aircraft wing, and a force service support group (FSSG). Each of these contain organic engineer support. The MEF forms task-organized Marine air-ground task forces (MAGTFs) to meet expeditionary operations in a littoral environment. These task forces may be an entire MEF, a MEF forward, or a Marine expeditionary unit (MEU). Each Marine division is

supported by one combat engineer battalion (CEB) that will provide close combat support and limited general- engineering support for the division through task-organized combat-engineer elements for ground-combat operations. Each Marine air wing is supported by a Marine wing support group (MWSG). This organization contains four (Marine wing support squadrons (MWSS) that provide limited organic combat and general-engineering support. The entire MEF is supported by an engineer support battalion (ESB) organic to the FSSG. The ESB is organized to provide combat engineering and limited general engineering support to the entire MEF.

d. **Navy.** The Naval construction force (NCF), known as the Seabees, is a responsive, mobile, versatile engineer force, capable of accomplishing diverse tasks. These tasks range from timber bunker construction in a forward combat environment to construction and operation of an advanced industrial facility to support naval operating forces and the logistics pipeline. NCF units enhance MAGTF operations through complimentary, not duplicative, support. NCF units are highly skilled specialists capable of executing projects of a more sophisticated and permanent nature than normally accomplished by Marine Corps engineer battalions. The Navy has two naval construction brigades (NCBs): 2nd NCB (Atlantic Fleet) and 3rd NCB (Pacific Fleet). These brigades oversee all NCFs, active and reserve, within their AO.. Naval construction regiments (NCR), underwater construction teams (UCT), construction battalion maintenance units (CBMU), and construction battalion units (CBU) all report to NCBs. An NCR consists of a regimental headquarters, assigned Naval mobile construction battalions (NMCB), and a Naval construction force support unit (NCFSU). Amphibious construction battalions (ACB or PHIBCB) are NCF units that report to the Naval beach groups. NCF units are described below.

(1) **Naval Mobile Construction Battalion.** NMCB is the backbone of the Naval construction force. Each battalion is composed of 726 personnel and 230 pieces of construction equipment. NMCB's main mission is construction. Each NMCB is capable of providing a tailored air detachment of 91 personnel with a fully task-organized, airmobile construction equipment allowance to meet the needs of the mission. Expeditionary construction capabilities include both horizontal and vertical construction. NMCB is fully capable of splitting into two smaller units. The mission of NMCB is to provide responsive military construction support, conduct battle damage repair operations—including rapid runway repair, construct base facilities, and conduct defensive and limited offensive operations against overt or clandestine enemy attacks.

(2) **Naval Construction Force Support Unit.** NCFSU consists of four sections: administrative services, equipment management, engineer support, and logistics. Its mission is to augment logistics-oriented and construction support for an NCR and up to four NMCBs.

(3) **Construction Battalion Maintenance Unit.** This unit provides follow-on operations maintenance and repair at advance base shore facilities. CBMUs perform security operations and maintain their own defense.

(4) **Construction Battalion Unit.** This unit provide support to fleet hospitals. Normally, three CBUs deploy to provide necessary engineering, construction, maintenance, and repair services to support fleet hospitals, including initial construction and follow-on maintenance activities.

(5) **Underwater Construction Team.** These teams are specially trained and equipped to provide underwater engineering, construction, repair, and inspection capabilities to meet Navy, Marine Corps, or joint force operational requirements. UCTs perform complex in-shore and

deep-ocean, underwater construction tasks in any climate. They provide ocean bottom surveys for appropriate site selection of underwater facilities.

(6) **Amphibious Construction Battalion.** These battalions provide civil engineering support to the Naval beach group during initial assault and follow-on phases of amphibious operations. PHIBCB operations include—

- Assembling pontoon causeways.
- Establishing ship-to-shore fueling systems.
- Constructing and assembling piers.
- Operating pontoon barges.
- Performing automotive maintenance.
- Providing limited beach improvements..

4**. Civil Augmentation Programs (CAP).** Civil augmentation contracts are scoped to provide area wide support for multiple projects within the theater of operations. A single contractor managed by a single command providing engineering and logistics supportintegrates the continuum of construction, facilities maintenance, and logistics services within logistics bases and base camps more effectively and efficiently than individual contractors managed by various component commands and their subordinate commands. Within a given theater, subcontractors, materiel, and personnel may come from many countries within the region. The concept of a single, integrating contractor meeting large and continuing requirements was developed to prevent multiple agencies and their contractors from bidding against one another for services and materiel in theater. Some of the strengths and weaknesses of these contracts are delineated in Figure A-3.

Strengths	Weaknesses
Flexible, responsive support	Forcible entry
Contractor maintains a warm base	Security for contractor
Tailored for different size force	Up front funding must be obtained from the supported customer
Adapted to provide additional services	
Can support early entry, sustainment, and redeployment	
Does not compete with strategic lift	
Capitalizes on global corporate capabilities	
Another option for commander	

Figure A-3. Civil Augmentation Program Strengths and Weaknesses

a. **Air Force.** The Air Force Contract Augmentation Program (AFCAP) is a cost-plus award fee contract that is centrally administered by the Air Force's Civil Engineer Support Agency, at Tyndall AFB, FL, through the Air Force's major command civil engineers. The contract was designed to augment or relieve specified base operating support (BOS) functions participating in military operations other than war (MOOTW). Capabilities focus on temporary contingency skills to sustain military forces and to support a 10,000-person force at up to eight different locations for periods of 180 or more days.. Once an AFCAP contract is in place, an initial cadre responds on-site as soon as possible to begin tasked operations, but typically within 30 calendar days.Each task order specifies the required response, for example, from 1 to 60 days).

b. **Army.** LOGCAP is an Army program funded in peacetime as a component of Army readiness. As a program, it encompasses all Army preplanned contingency contracts and contingency components of contracts. Currently, the Army's broad logistics and engineering contingency support contract is managed by the US Army Materiel Command. This contract is a cost-plus award fee contract. The key is that in peacetime the LOGCAP contractor maintains an on-call, preplanned, ready capability. The contractor demonstrates his readiness through the development of a

worldwide plan, supporting plans to OPLANs, specific regional plans, and participation in exercises.

(1) **USAMC Support Contract.** The USAMC support contract supports both engineering/construction and general logistics services. USACE supportsUSAMC for the engineering and construction contract administration and the Defense Contract Management District International (DCMDI)—a component of the Defense Logistics Agency—for logistics services contract administration.

(2) **LOGCAP Support Contract.** In the theater of operations, the USAMC Logistics Support Element (LSE), which is subordinated to the senior Army logistics commander in theater, manages the LOGCAP support contract. The LOGCAP contract is scoped to support all DOD components and missions and is a *cost-plus award fee* services contract that supports three major activity areas:

(a) Facilities repair and construction.

(b) Base operations and maintenance.

(c) Logistics services.

c. **Navy.** The Navy maintains two emergency construction capability contracts (CONCAP) that are cost reimbursable contracts administered by the Atlantic and Pacific Engineering Field Divisions of COMNAVFACENGCOM (Commander, Naval Facilities Engineer Command). These contracts are awarded to joint venture partners that are large, international construction firms. These contracts offer enormous capabilities and fast response. The contractor's 5 percent management fee is flexible and graded on a number of factors, including cost controls. CONCAP has been used for engineering field work in Bosnia and for disaster response with Hurricane Bertha at Camp Lejeune.

This construction-oriented contract may be used worldwide, including CONUS. Major capabilities include—

(1) Engineering and design.

(2) Airfield and port facilities; piers and dredging.

(3) Roads, bridges, ordnance facilities, landfills.

(4) Power plants and utility systems.

(5) Communication and supply facilities.

(6) Medical and prison facilities.

(7) Wide area decontamination.

(8) Facility and utility operations.

Appendix B

Contract Construction Agents (CCAs)

1. **Introduction.** DOD Directive 4270.5, "Military Construction Responsibilities," designates DOD CCAs as the US Army Corps of Engineers and the Naval Facilities Engineering Command. Their responsibilities include awarding and managing construction contracts that support military operations. Related to these responsibilities are the leasing of real estate. In addition, CCAs provide technical engineering support such as topographic engineering, force-protection engineering, and cold weather mobility to deployed commanders. Overseas, USACE and NAVFACENGCOM are assigned specific countries of responsibility predicated on the predominance of Service forces and CCA activity.

a. USACE is the CCA in Germany, with its heavy Army and Air Force presence.

b. NAVFACENGCOM is the CCA in Italy and the western Mediteranean Sea, with its heavy Navy presence.

c. In Great Britain, the USAF is the CCA.

d. For those countries for which there is no DOD-designated CCA, the CINC usually designates a CCA for contingency support.

2. **US Army Corps of Engineers.** USACE is the Army major command assigned responsibilities to execute Army and Department of Defense (DOD) military construction and real estate acquisition and the Army's Civil Works program. Combined, these programs give USACE a dual perspective. The command is organized into a headquarters in Washington, DC, 8 divisions, 39 districts, 2 program centers, 4 laboratories, and 2 technical centers.

a**. Civil Works Program.** The Civil Works Program places USACE in the role of developing the national infrastructure, to include the associated planning, design, and execution of complex projects of regional and national significance. In that role, USACE is responsible for the operation and maintenance of the nation's navigable waters and maintenance of the nation's deep and shallow draft ports, including the strategic ports. USACE has a major national role in flood control, flood fighting, and disaster response. In addition, USACE is the DOD planning and execution agency for engineering and public works under the Federal Emergency Management Agency (FEMA) Federal Response Plan.

b**. Military Program.** Through its military program, USACE designs and constructs military facilities and supports military installations worldwide. The military program is supported by expertise in the design and construction of military facilities ranging from barracks to chemical weapons demilitarization complexes. The military engineering expertise of the corps focuses on the engineering required to plan, design, and construct military facilities and the environmental engineering necessary to execute DOD installation environmental restoration projects. As a component of the military program, USACE maintains expertise in its laboratories and centers for public works engineering, cold weather engineering, remote sensing and imagery, force-protection design, airfield design, terrain analysis for mobility and countermobility, topographic engineering, security systems engineering, and weapons effects (support for USAF operational targeting—assess the target, identify the appropriate weapon system, attack profile, etc). The Army's 249th Engineer Battalion (Prime Power) is a subordinate command of USACE.

c**. Combined Capabilities.** The synergy resulting from the combined capabilities of the two major programs and the associated specialized expertise in its laboratories and centers allows USACE to leverage its civil infrastructure expertise to support a broad range of OCONUS military and DOD support operations:

(1) Support for counterdrug operations in South America.

(2) Technical expertise to the Philippine Government addressing the recovery from the Mount Pinatubo eruptions.

(3) Prediction of wave climate conditions at specific littoral sites for logistics-over-the-shore operations.

(4) Prediction of river stage elevations for river basins.

These operations include support to the State Department, US Agency for International Development, and Office of Foreign Disaster Assistance.

d. **Organization.** USACE subordinate commands are organized geographically and functionally. The corps has four major organizational structures.

(1) **Division Commands.** The division is the major subordinate command (MSC) and control organization for USACE. Division commanders provide executive direction to and management of the subordinate district commands. The division's orientation is regional and provides broad interface with regional interests and management of division-wide programs.

(2) **District Commands**. The district command is the operating arm of the division. All CONUS USACE districts in the US have civil works responsibilities. In the US, their boundaries are delineated along major watershed basins (see Figure B-1). In addition, some of the districts have military program execution responsibilities.

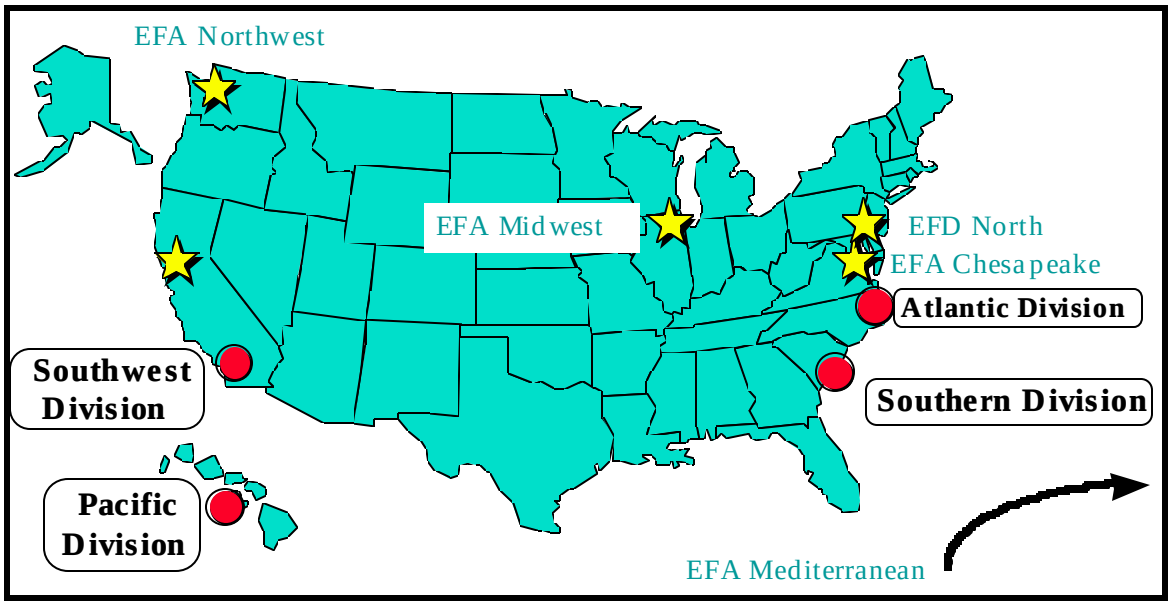

Figure B-1. Locations of NAVFACENGCOM Field Divisions

Their work lines are set on state boundaries (see FigureB-2). The districts maintain in-house core capabilities in planning, engineering, construction, operations, project management, and contract administration.

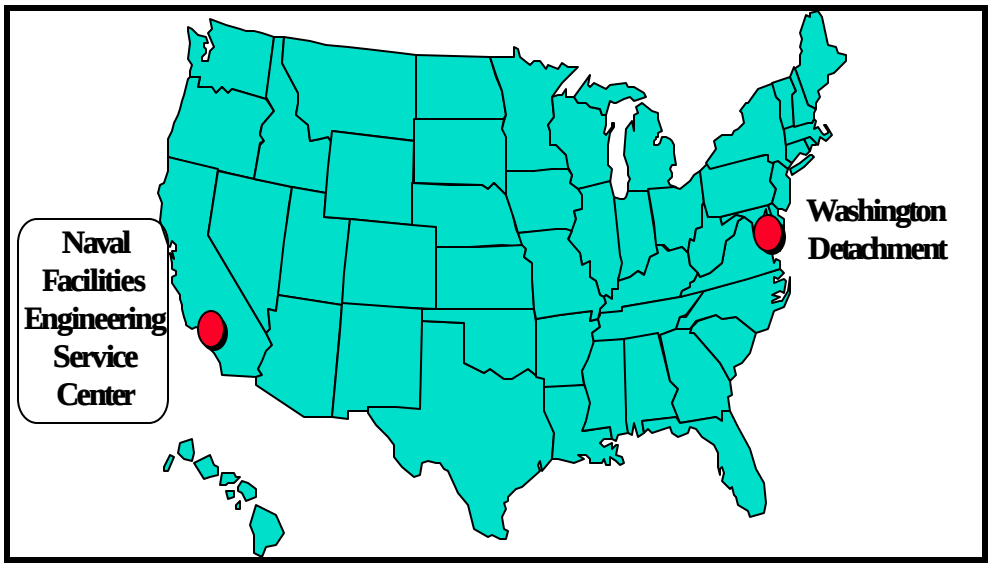

Figure B-2. Naval Facilities Engineering Service Center Locations

OCONUS CINCs receive all support from USACE through the following subordinate USACE commands:

(a) US Forces Korea by Far East District (Seoul, Korea).

(b) US Forces Japan by Japan District (Camp Zama, Japan).

(c) Pacific Command by Honolulu District (Fort Shafter, Hawaii).

(d) Southern Command by Mobile District (Mobile, Alabama).

(e) European Command by Transatlantic Programs Center, Europe (Wiesbaden,Germany)

(f) Central Command by Transatlantic Programs Center (Winchester, Virginia).

(3) **Laboratories.** USACE has four laboratories that conduct research and development to support the Army and other Services. By virtue of their engineering expertise, lab personnel provide operational support to the rest of USACE and DOD

through the aforementioned subordinate commands. The laboratories and some of their relevant capabilities are—

(a) Waterways Experiment Station (WES), Vicksburg, MS. Vehicle mobility and trafficability, coastal engineering; structural hardening against weapons effects; facilities camouflage, concealment, and deception technology; geotechnical expertise, and pavement/surface treatment technologies.

(b) Topographic Engineering Center (TEC), Fort Belvoir, VA. Specialized engineer mapping products, analysis of remote sensing data, and terrain analysis.

(c) Cold Regions Research and Engineering Laboratory (CRREL), Hanover, NH). All aspects of engineering research with respect to conditions unique to very cold weather.

(d) Construction Engineering Research Laboratory (CERL), Champaign, IL. Construction management technology and facilities engineering.

(4) **Centers**. Centers provide support to the command in specialized or specific technical areas. They have no geographic boundaries. Two major centers are the Huntsville Engineering and Support Center (Huntsville, AL) and the Center for Public Works (Fort Belvoir, VA). In addition, USACE maintains several specialized centers of expertise (e.g., force protection, airfield design, and physical security).

e. **Support for Military Operations.** USACE supports US Army and DOD missions worldwide.

(1) **Power Projection.** The Army projects power worldwide from its major installations. These power-projection platforms receive, equip, and train units; receive

materiel; and deploy units and materiel. In support of power projection, USACE has a two-fold mission:

(a) To provide engineering and construction support to Army power-projection platforms and strategic ports, and

(b) To leverage the commercial industrial base to support operations, both in CONUS and OCONUS.

(2) **Theater Missions.** In support of the Army and DOD, the predominant USACE mission is the acquisition of real estate and design and construction of facilities. The Topographic Engineering Center provides technical support to divisional terrain teams and Army topographic engineering battalions and companies. In addition, USACE provides technical assistance within the whole spectrum of engineering, from division through theater engineers. Although the support that USACE provides to theAir Force as its design and construction agent is not as broad as that provided to the Army, it is no less important. As a designated DOD construction agent, USACE provides engineering and construction management services to other Services and DOD agencies in DOD-designated countries through its OCONUS subordinate commands. The USACE commander in the field may establish a forward command element dedicated to the theater support mission. Initially, the USACE forward command is assigned to either the Army component command or the CINC. That forward USACE element draws on the resources of the rest of USACE to provide the engineering support required.

(3) **CONUS Contingency Missions.** USACE is the single most active DOD agency under the capstone Military Support to Civil Authorities (MSCA) Program (DOD

Directive 3025.1). Most USACE operations in CONUS are executed under two major authorities:

(a) **Public Law 84-99, Flood Control and Coastal Emergencies (FC&CE).** Through this law, USACE has unique authorities for flood-fighting and disaster preparedness. USACE operates flood control (or damage reduction) structures (dams and levee systems) and provides technical assistance to state and local authorities. In addition to FC&CE, USACE has authority for the operation and maintenance of the nation's navigable waterways.

(b) **Federal Response Plan (FRP).** Under the FRP, USACE is the Federal Emergency Management Agency's (FEMA) lead operating agent (DOD designation) for emergency support function three (ESF 3), public works and engineering. In this role, USACE is the equal of the other US Government departments and agencies. When activated, USACE is responsible for engineering missions such as debris removal and disposal, temporary repair and construction of facilities, acquisition and distribution of emergency water supplies, and provision of electric power. When DOD engineer units are activated to execute disaster response missions under ESF 3, USACE provides mission taskings through the defense coordinating officer. Unlike OCONUS support, the prime power battalion assets remain under the command and control of USACE in CONUS disaster response. Thus, in a given disaster, USACE may be operating under its own authority, executing FRP missions with support from CINCPAC, CINCSOUTH, or

CINCACOM, and executing missions to provide sustainment support for CINCPAC, CINCSOUTH, or CINCACOM forces.

3. **US Naval Facilities Engineering Command.** NAVFACENGCOM and its field divisions directly support the Navy and Marine Corps shore establishment throughout the world with a wide variety of military and contract construction, real estate acquisition, and public works services. NAVFACENGCOM, through engineering support units—

a. Provides project management, planning, design engineering, construction, operations and maintenance, and disposal functions for Navy and Marine Corps shore facilities and real estate.

b. Provides engineering, logistics, doctrine and policy support, and guidance for NCF units. This mission includes—

(1) Planning design, construction, and public works support for Navy family housing and bachelor quarters.

(2) Acquiring and disposing of Department of Navy (DON) real estate.

(3) Executing shoreside environmental restoration projects.

(4) Providing technical expertise to manage environmental, natural resources, transportation equipment, and fire protection programs.

(5) Managing energy conservation programs.

(6) Assuming claimant responsibility for naval bases operationally closed as a result of base closure and realignment actions.

(7) Serving as major claimant for naval construction battalion centers and the NCF.

(8) Providing technical mission-related support to other DOD and federal agencies assigned.

(9) Providing technical expertise to higher Navy and Office of the Secretary of Defense as appropriate.

(10) Performing other functions and tasks assigned by higher authority.

a. **Organization.** NAVFACENGCOM and subordinate commands are organized geographically and functionally. NAVFACENGCOM headquarters is located in Washington, DC. It has four engineering field divisions, six engineering field activities, ten public works centers, officers in charge of construction (OICC), and one Naval facilities engineering service center.

(1) **Engineering Field Divisions (EFDs) and Engineering Field Activities (EFAs).** EFD commanders provide executive management and expert engineering support for all Naval and Marine Corps facilities in a geographic area of responsibility. Engineering field activities (EFAs) provide the same support for smaller CONUS and overseas areas within the EFDs greater geographic area. Both EFDs and EFAs have design engineering and architectural capabilities. They act as technical consultants for all facilities of supported commands. EFDs play a significant role in contingency operations, such as real estate operations, forward-deployed resident OICCs, and management of contingency capabilities contracting (CONCAP).

(2) **Officer in Charge of Construction (OICC).** Officers in charge of construction (OICC) are designated by the EFD command as contracting officers in certain geographic locations where the complexity and contracting tempo warrant. The EFD

can assign a resident officer in charge of construction (ROICC) in any geographic location required. The ROICC is trained in facilities support, construction, engineering and environmental design, and real estate contract acquisition and management. The ROICC office is especially useful for contingency operations and assignment to JTF organizations. The ROICC may provide construction management services to Army, Air Force, and DOD facilities, as well as to other federal agencies.

(3) **Naval Facilities Engineering Service Center.** The Naval Engineering Service Center (NFESC) provides engineering support and expertise to the Navy in undersea and amphibious operations, conventional ammunition storage, mobile utilities and environmental support equipment, and research and consulting engineering services.

b. **Support for Military Operations.** NAVFACENGCOM supports Navy and Marine Corps operations as well as other DOD missions around the world.

(1) **Power Projection.** The Navy projects power worldwide by use of superior naval, air, and amphibious forces, equipment, tactics, and doctrine. This force projection requires shore logistic platforms, such as advanced logistics support sites (ALSS), and ports to receive supplies, equipment, and personnel to be deployed to ships and forward operating bases. NAVFACENGCOM directly supports these activities by providing engineering, construction forces, contract construction, facilities management, and disposal of logistics ports and bases.

(2) **Theater Missions.** NAVFACENGCOM supports the theater of operations through real estate acquisition and management and disposal and construction of facilities to support Navy, Marine Corps, and other DOD elements.

NAVFACENGCOM provides these services through the subordinate EFD and EFA. It provides technical engineering and construction support to other Services and DOD agencies through the NCF and assigned CCA. The NAVFACENGCOM commander may assign a forward element dedicated to the theater or assigned to a CINC or JTF command. The forward element has the full capability of the entire NAVFACENGCOM to assist in providing this support.

(3) **CONUS Contingency Missions.** NAVFACENGCOM is responsible for disaster recovery and other contingency operations at Naval and Marine Corps stations in CONUS. With NCF personnel and equipment, as well as contracting capabilities, NAVFAC can quickly mobilize and assemble tremendous assets to mitigate the effects of the disaster.

Appendix C

Disaster Assistance in the United States

1. Introduction. DOD has the capability to rapidly respond to a broad spectrum of emergencies within the US and its territories. DOD provides self-deploying, self-sustaining forces with a wide variety of skills and equipment. These forces comprise a well-trained and organized capability, which is especially valuable in the early phases of disaster relief operations. In addition, DOD provides many resources such as air transportation (strategic to tactical lift), supplies for victims, and engineers for emergency debris clearance and emergency repair to civil infrastructure.

2. Military Support to Civil Authorities (MSCA). In major disasters, state and local government capabilities can be overwhelmed by the magnitude of damage and size of the damage area. Under MSCA (DOD Directive 3025.1), DOD provides support for state and local governments. In emergencies; there are several laws, executive orders, and plans which allow DOD assets to respond to civil emergencies. The most prominent of these plans is the Federal Response Plan (FRP) which is executed under Public Law 93-288 and managed by the Federal Emergency Management Agency (FEMA). For more information refer to Joint Pub 3-07.7, "Joint Tactics, Techniques, and Procedures for Domestic Support Operations."

3. Operational Phases. The four phases of disaster readiness and operations are sequential and may all occur concurrently during a disaster.

a. **Mitigation.** Long term actions or projects to reduce the potential for damage.

b. **Preparation.** Emergency response planning, equipping, training, and exercising.

c. **Response.** Immediate action to save life and property.

d. **Recovery.** Actions to bring the impacted area back to pre-disaster conditions)

4. Organization. The Secretary of the Army (SECARMY) is the DOD Executive Agent for MSCA. The DOD Director of Military Support (DOMS) is the Executive Agent's staff for domestic emergency response operations.

a. **Commanders in Chief (CINCs).** The three CINCs—USCINCACOM, USCINCPACOM, and USCINCSOUTHCOM—with US geographical responsibilities are the DOD principal planning agents and operating agents for DOD MSCA for their respective joint operational area (JOAs). They are responsible for all planning and response related to general support to civil authorities.

b. **Defense Coordinating Officer (DCO).** The DCO is the DOD representative designated to coordinate MSCA on the scene activities with the federal coordinating officer (FCO), typically a FEMA official. FEMA and other federal agency requests for support from DOD go through the DCO for validation and resourcing from appropriate military organizations.

c. **Joint Task Force.** Joint task forces may be established for major and catastrophic disasters. Taskings or missions from the DCO would go to the joint force commander for execution.

d. **Department of Defense.** In the FRP, DOD is responsible for emergency support function (ESF) 3, engineering and public works. DOD has designated USACE as its lead planning and operating agent for ESF 3. In this role, USACE is a peer of the other departments and agencies under the FRP. It is therefore an agency supported by the CINCs in disasters and not subordinate to the CINCs.

5. **Engineer Support.** Most engineer support is focused on response operations with declining support on recovery operations. Key objectives are to take immediate actions to save lives and property, assist in stabilizing the disaster area, and withdraw as quickly as possible. Federal response and recovery under the FRP focus on two basic areas:

- Infrastructure (engineer dominant)
- Human services (engineer support)

a. In disaster response and recovery operations, engineers may provide the primary effort. Engineers focus on response and recovery missions. Engineers should be among the first units to deploy since the completion of basic infrastructure repairs are required before other emergency responders can perform their response missions. Initially, engineers conduct the following missions:

(1) Emergency debris clearance from critical transportation facilities.

(2) Emergency repairs to public facilities such as shelters.

b. USACE executes a variety of missions under ESF 3. For disaster operations in the US, USACE retains command and control of the 249th Engineer Battalion (Prime Power). Major infrastructure missions for engineers are:

(1) Perform emergency debris removal from roads and other transportation facilities.

(2) Provide emergency power.

(3) Provide emergency repairs to public facilities.

(4) Provide emergency repairs to housing.

(5) Clear and reduce debris.

(6) Provide temporary housing.

c. Often, in the earliest stages of response operations, military engineers are the first engineer capability on the disaster scene. Simultaneously, USACE works with the FEMA staff to develop ESF 3 missions and solicit contractors to execute ESF 3 missions. In the interim, joint force engineers execute designated ESF 3 missions. Under standard FRP procedures, USACE provides requests for DOD engineer support to the DCO and subsequently provides ESF 3 missions for joint force engineers to execute. However, in order to coordinate and effectively manage engineer activities, the USACE commander should establish direct liaison with the engineers executing the ESF 3 missions. The most effective way to assure unity of effort between USACE, its contractors, and engineers is for the ESF 3 team leader to coordinate mission-potential ESF 3 mission assignments directly with the joint force engineer commander for assignment of missions to the joint force. The executing USACE district commander will continue to coordinate mission execution with joint force engineers. See Figure C-1.

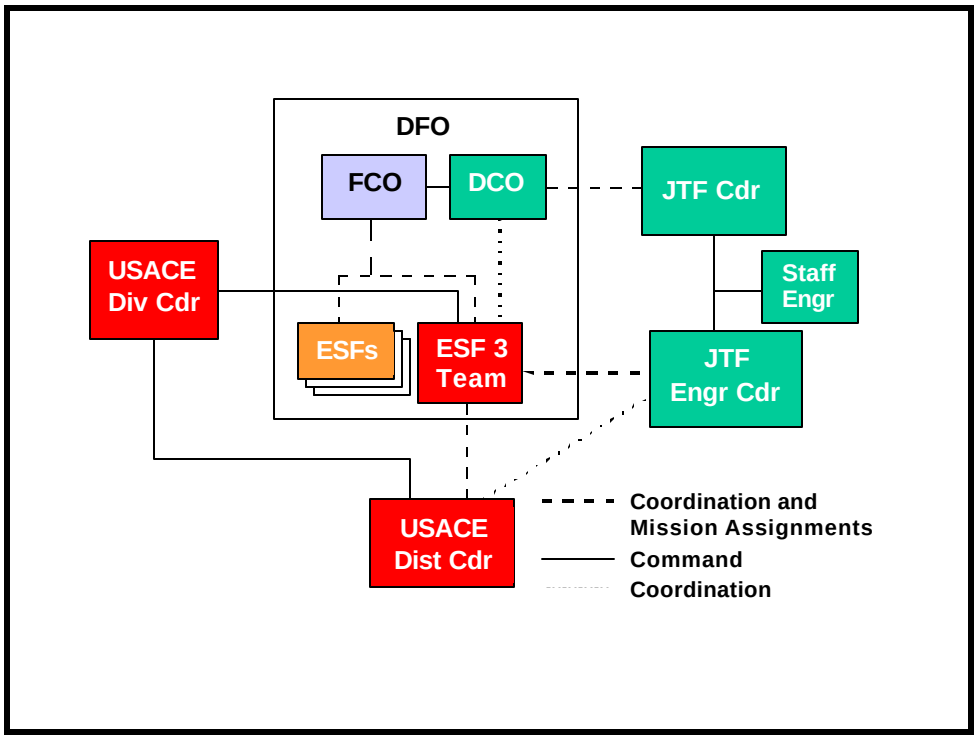

Figure C-1. Engineer Relationships in Disaster Response

Appendix D

References

Joint and Combatant Command Publications

Joint Pub 0-2. "Unified Action Armed Forces(UNAAF)." 24 February 1995.

Joint Pub 1-02. "DOD Dictionary for Military and Associated Terms." 23 March 1994.

Joint Pub 2-0. "Joint Doctrine for Intelligence Support to Operations." 5 May 1995.

Joint Pub 2-01. "Joint Intelligence Support to Military Operations" (Draft).

Joint Pub 2-01.1 "Joint Tactics, Techniques, and Procedures for Intelligence Support to Targeting" (Draft).

Joint Pub 2-03. "Joint Tactics, Techniques, and Procedures for Global Geospatial Information and Services Support to Joint Operations" (Draft).

Joint Pub 3-0. "Doctrine for Joint Operations." 1 February 1995.

Joint Pub 3-07. "Joint Doctrine for Military Operations Other Than War." 16 June 1995.

Joint Pub 3-07.2. "Joint Tactics, Techniques, and Procedures for Antiterrorism." 25 June 1993.

Joint Pub 3-07.3. "Joint Tactics, Techniques, and Procedures for Peace Operations" (Revision Draft).

Joint Pub 3-07.6. "Joint Tactics, Techniques, and Procedures for Foreign Humanitarian Assistance" (Draft).

Joint Pub 3-07.7. "Joint Tactics, Techniques, and Procedures for Domestic Support Operations" (Draft).

Joint Pub 3-08. "Interagency Coordination During Joint Operations" Vol. I and II. 9 October 1996.

Joint Pub 3-15. "Joint Doctrine for Barriers, Obstacles, and Mine Warfare" 30 June 1993.

Joint Pub 3-16. "Joint Doctrine for Multinational Operations" (Draft).

Joint Pub 3-33. "Joint Force Capabilities" (Draft).

Joint Pub 3-57. "Doctrine for Joint Civil Affairs" (Revision Draft).

Joint Pub 3-58. "Joint Doctrine for Military Deception." 6 June 1994.

Joint Pub 4-0. "Doctrine for Logistics Support to Joint Operations." 27 January 1995.

Joint Pub 4-01.6. "Joint Tactics, Techniques, and Procedures for Joint Logistics Over the Shore (JLOTS)." 22 August 1991.

Joint Pub 404. "Joint Doctrine for Civil Engineering Support."

Joint Pub 5-0. "Doctrine for Planning joint Operations." 13 April 1995.

Joint Pub 5-00.2. "Joint Task Force Planning Guidance and Procedures." 3 September 1991.

Service Publications

AFDD 1. "Air Force Basic Doctrine." 18 September 1997.

AFDD 2. "Global Engagement" (Draft).

AFDD 2-3. "Military Operations Other Than War. 5 October 1996

AFDD 2-4.3. “Civil Engineering” (Draft).

“PRIME BEEF Implementation Guide.” 1995.

Air Force Handbook 10-222, Volumes 1-6. 1 July 1996.

Air Force Environmental Handbook for Contingency Operations. 1 August 1996.

Naval Warfare Pub 4-04. “Naval Civil Engineering Operations.”

Naval Warfare Pub 4-04.1/Marine Corps Warfare Pub 4-25.2. “Seabee Operations in the MAGTF” (Draft).

Naval Warfare Pub 4-04.2. “Naval Civil Engineer Operations for the Component Commander.”

NAVFAC P315. “Naval Construction Force Manual.”

FM 5-30. “Engineer Intelligence.” 22 September 1967.

FM 5-33. “Terrain Analysis.” 11 July 1990.

FM 34-3. “Intelligence Analysis.” 15 March 1990.

FM 34-130. “Intelligence Preparation of the Battlefield.” 8 July 1994.

FM 5-36. “Route Reconnaissance and Classification.”

FM 5-71-2. “Armored Task-Force Engineer Combat Operations.” 28 June 1996.

FM 5-71-100. “Division Engineer Combat Operations” 22 April 1993.

FM 5-100. “Engineer Operations.” 27 February 1996.

FM 5-100-15. Corps Engineering Operations.” 6 June 1995.

FM 5-101. “Mobility.” 23 January 1985.

FM 5-103. “Survivability.” 10 June 1985.

FM 5-104. “General Engineering.” 12 November 1986.

FM 5-105. “Topographic Operations.” 30 September 1993.

FM 5-114. “Engineer Operations Short of War.” 13 July 1992.

FM 5-490. “Engineer Diving Operations” 31 March 1992.

FM 6-20-10. “TTP for the Targeting Process.” 8 May 1996.

FMFM 13. “MAGTF Engineer Operations.” 10 February 1992.

FMFM 13-4. “Naval Construction Force Support to MAGTF Operations” 9 August 1991.

Executive Orders, DOD Directives, and Joint Staff Instructions

Executive Order 12114. “Environmental Effects Abroad of Major Federal Actions. 4 January 1979.

Executive Order 12656. “Assignment of Emergency Preparedness Responsibilities.”

DOD Directive 2000.13. “Civil Affairs.” 27 June 1994.

DOD Directive 3025.1. “Military Support to Civil Authorities.”

DOD Directive 5100.46. “Foreign Disaster Relief.” 4 December 1975.

DOD Directive 6050.7. “Environmental Effects Abroad of Major Federal DOD Actions.” 31 March 1979.

DOD Directive 6050.16. “Policy for Establishing and Implementing Environmental Standards at Overseas Locations.” 20 September 1991.

Joint Staff Instruction 3820.01. “Environmental Engineering Effects of DOD Actions.” 28 September 1993.

CJCSM 3122.03. “Joint Operations Planning and Execution System, Vol II (Planning Formats and Guidance).”

Federal Response Plan.

Appendix E

Administrative Instructions

1. **User Comments.** Users in the field are highly encouraged to submit comments on this publication to the Joint Warfighting Center, ATTN: Doctrine Division, Fenwick Road, Bldg 96, ATTN: Doctrine Division, Fort Monroe, VA 23651-5000. These comments should address content (accuracy, usefulness, consistency, and organization) writing, and appearance.

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b. When a Joint Staff directorate submits a proposal to the Chairman of the Joint Chiefs of Staff that would change source document information reflected in this publication, that directorate will include a proposed change to this publication as an enclosure to its proposal. The Military Services and other organizations are requested to notify the Director, J-7, Joint Staff, when changes to source documents reflected in this publication are initiated.

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Marine Corps:	Marine Corps Logistics Base Albany, GA 31704-5000
Coast Guard:	Coast Guard Headquarters, COMDT (G-OPD) 2100 2nd Street, SW Washington, DC 20593-0001

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GLOSSARY

PART I--ABBREVIATIONS AND ACRONYMS

AAFS	amphibious assault fuel system
ACB (PHICM)	amphibious construction battalion
AFCAP	Air Force Contract Augmentation Program
ALSS	advanced logistics support sites
AO	area of operations
BEEF	base engineer emergency force
BOS	base operating support
CBMU	construction battalion maintenance unit
CCA	contract construction agent
CEB	combat engineer battalion
CERL	Construction Engineering Research Laboratory
CINC	commander in chief
COA	course of action
CONCAP	construction capabilities contracts
CONUS	continental United States
CP	command post
CREST	contingency real estate support team
CRREL	Cold Regions Research and Engineering Laboratory
CSE	combat support equipment
C^2	command and control
D&A	departments and agencies
DCO	defense coordinating officer
DCMDI	Defense Contract Management District International
DLA	Defense Logistics Agency
DOD	Department of Defense
DOE	Department of Energy
DOMS	Director of Military Support
DON	Department of the Navy
DSO	domestic support operations
EA	engagement area
EAC	echelons above corps
EFA	engineering field activities
EFD	engineering field divisions
ELCAS	elevated causeway systems
ENCOM	engineer command
EOD	explosive ordnance disposal
ESB	engineer support battalion
FC&CE	flood control and coastal emergencies
FCO	federal coordinating officer

FEMA	Federal Emergency Management Agency
FHA	foreign humanitarian assistance
FOB	forward operating bases
FRP	Federal Response Plan
ESF	emergency support function
FSSB	force service support group
GI&S	geospatial information and services
HCA	humanitarian civic assistance
HHC	headquarters and headquarters company
HHD	headquarters and headquarters detachment
HN	host nation
HSC	headquarters support company
IPB	intelligence preparation-of-the-battlespace
IO	international organizations
ISB	intermediate staging base
JFC	joint force commander
JLOTS	joint logistics over the shore
JOA	joint operational area
JRSO&I	joint reception, staging, onward movement and integration
JTCB	joint target coordinating board
JTF	joint task force
LE	light equipment
LOGCAP	Logistics Civil Augmentation Program
LOC	lines of communication
LOTS	logistics over the shore
LSE	logistics support element
MAGTF	Marine air-ground task force
MEF	Marine expeditionary force
MEU	Marine expeditionary unit
METT-TC	mission, enemy, time, troops available, terrain, civilian considerations
MOOTW	military operations other than war
MRB	multi-role bridge
MSC	major subordinate command
MSCA	military support to civil authorities
MSR	main supply route
MWSG	Marine wing support group
MWSS	Marine wing support squadron
NAVFACENGCOM	Naval Facilities Engineering Command
NBC	nuclear, biological, chemical
NCB	Naval construction brigades
NCF	Naval construction force
NCFSU	Naval construction force support unit

NCR	Naval construction regiment
NFESC	Naval Facilities Engineering Service Center
NGO	nongovernmental organization
NMCB	Naval mobile construction battalion
OCONUS	outside continental United States
OFDA	Office of Foreign Disaster Assistance
OPDS	offshore petroleum discharge system
OPLAN	operations plan
OICC	officer in charge of construction
PHO	post hostilities operations
POL	petroleum oils and Lubricants
PPA	principal planning agents
PVO	private voluntary organization
RED HORSE	rapid emergency deployable heavy operational repair squadron engineers
ROE	rules of engagement
ROICC	resident officer in charge of construction
SECARMY	Secretary of the Army
TEC	Topographic Engineering Center
TFE	Task Force Eagle
TPFDD	time phased force deployment document
UCT	underwater construction team
USACE	United States Army Corps of Engineers
USAF	United States Air Force
USAID	United States Agency for International Development
USAMC	United States Army Material Command
USC	United States Code
UN	United Nations
US	United States
USCINCPACOM	United States Commander in Chief Pacific Command
USCINCSOUTHCOM	United States Commander in Chief Southern Command
UXO	unexploded ordnance
WES	Waterways Experimental Station

PART II—TERMS AND DEFINITIONS

civil engineering. Those combat support or combat service support activities that identify, design, construct, lease or provide facilities, and which operate, maintain, and perform war damage repair and other engineering functions in support of military operations. JP 1-02.

combat engineering. Those engineering tasks that assist the tactical/operational commander to "shape" the battlespace by enhancing mobility creating the space and time necessary to generate mass and speed while protecting the force, and denying mobility and key terrain to the enemy. These tasks include breaching, bridging, and emplacement of obstacles to deny mobility to the enemy. **

countermobility operations. The construction of obstacles and emplacement of minefields to delay, disrupt, and destroy the enemy by reinforcement of the terrain. The primary purpose of countermobility operations is to slow or divert the enemy, to increase time for target acquisition, and to increase weapons effectiveness. **

DOD construction agent. The Corps of Engineers, Naval Facilities Engineering Command, or other approved DOD activity, that is assigned design or execution responsibilities associated with military construction programs, facilities support, or civil engineering support to the combatant commanders in contingency operations. JP 1-02.

environmental protection. The application of human ingenuity and resources, through the disciplines of science and engineering, as required by environmental protection laws , regulations, and policies, to protect the natural environment. **

environmental stewardship. The integration and application of environmental values into the military mission in order to sustain readiness, improve quality of life, strengthen civil relations, and preserve valuable natural resources.**

forward aviation combat engineering. A mobility operation where engineers perform tasks in support of forward aviation ground facilities. Tasks include reconnaissance, construction of low altitude parachute extraction zones, landing strips, and airstrips; and providing berms, revetments, and trenches for FARPs. **

general engineering. Those engineer tasks which increase the mobility, survivability, and sustainability of tactical and logistical units to the rear of the forward edge of battle area. Tasks include construction and repair of lines of communication, main supply routes, airfields and logistical facilities.**

mobility. A quality or capability of military forces which permits them to move from place to place while retaining the ability to fulfill their primary mission. JP 1-02.

survivability. Concept which includes all aspects of protecting personnel, weapons, and supplies while simultaneously deceiving the enemy. Survivability tactics include building a good defense, employing frequent movement, using concealment, deception, and camouflage; and constructing fighting and protective positions for both individuals and equipment. **

sustainment. The provision of personnel, logistic, and other support required to maintain and prolong operations or combat until successful accomplishment or revision of the mission or of the national objective. JP 1-02.

topographic engineering. Those engineering tasks that provide geospatial information and services to commanders and staffs throughout the range of operations. These tasks include terrain analyses, terrain visualization, digitized terrain products, nonstandard map products, and baseline survey data.**

** Upon approval of this publication, these terms will be included as part of Joint Publication 1-02. "DOD Dictionary of Military and Associated Terms"